

## Some Eastern Penstemons

MARY G. HENRY

ONE can dig deeply into the beautiful Penstemon family, for it is full of unusual and splendid plants.

For one reason or another they are rarely seen in our gardens. Chief of these reasons is because most of them require very special conditions and it is hard to accommodate them.

Quite overshadowed by their brilliant western cousins, but still sufficiently beautiful to form exquisite and imposing displays, our eastern penstemons should see the light of day in our gardens more frequently. No longer should they "bloom and blush unseen" in their native hills and dales. More quiet in their choice of colors, they are infinitely easier to grow. One thing is certain, the eastern penstemons are entirely suited to eastern conditions. They thrive mightily in summer droughts and winter wet spells, and there is no doubt that many of them will some day be permanent residents of our gardens.

During recent years I have grown over a hundred kinds of penstemon at Gladwyne. Many of these have succeeded beyond my fondest expectations and when they have bloomed their wonderful flowers have given me infinite pleasure.

Unfortunately the easily grown penstemons suffer neglect on account of the reputation of the more difficult ones. On dry banks where few plants can be made to grow many penstemons are entirely at home and form very attractive drifts. They make nice edgings to shrub borders when the different kinds are planted in informal groups, the shrubs making an excellent background for their tall and airy flower spikes.

In large rock gardens penstemons are perfectly at home. In the native habitat of some of the eastern species they often drape a section of a mountain side growing naturally among rocks, sometimes in crevices, where they make delightful ornaments, blooming so freely that scarcely a leaf is seen of the green rosette that forms the base of the plant. In small rock gardens many of them make neat but striking accent material. They all remain in bloom for a long time, either as cut flowers or when they are left on the plant. The stalks should be cut as soon as they cease to be ornamental, in order to prevent too promiscuous seeding.

Their compact root system makes them easy plants to transplant. They can even be moved when in bloom if this is done carefully.

Propagation is readily effected by pulling off side growths in early spring and rooting them in sand in a frame.

They are also easily grown from seed which is freely produced. Growth is rapid and they bloom the second season.

Let us be loyal to our beautiful native flora. Let us have more of our own treasures growing in our gardens. Above all, let us join our conservation units and help all we can to preserve our precious flowers before it is too late.

*Penstemon australis* blooms late in May. This is an unusual one because its flowers are invariably (to my knowledge) a deep pink with a showy brilliant orange bearded "tongue."

It is not quite as vigorous as some, but in a lightish soil it is an excellent grower and a very beautiful plant indeed. When well suited with a porous

root run it makes fine, large, long lived specimens and is a splendid ornament for the rock garden. Its height is about 15-20 inches.

*Penstemon australis* grows at a low altitude, near sea level in the coastal plain, in my experience, and I have found it in Virginia, South Carolina, Georgia and Florida. So, though hardy here in Pennsylvania, in all probability it will not succeed as far north as most of the following species.

*Penstemon arkansanus* is an inhabitant of the Ozarks that has found its way to my rock garden. It has only been here about a year but deserves a good reputation. It bears white flowers with a few purple lines and is an attractive plant, but not especially outstanding.

*Penstemon calycosus* is a very nice plant indeed, attractive, easily grown and can take care of itself in grass. It is rather like its close relative, *Penstemon digitalis*, except, instead of bearing white flowers, the blossoms have a decided lavender tinge, some are all lavender.

I found it growing naturally a few miles from my home in a situation similar to that frequently chosen by *Penstemon digitalis*, a low meadow in full sun with a clay soil. I have also frequently found it entirely happy on a dry bank.

*Penstemon canescens* blooms May 10-25, depending on the season, and is the first of these mentioned to come into flower.

The usual color of its blossoms, which are produced very lavishly on tallish spikes, is pale lavender, but near white and darker forms are quite common.

The finest form I have seen is a beautiful pale pink one, which I found on a mountain side in Virginia. It was growing in dry, stony soil on a steep slope, in full sun. I have reason to re-

member this particular plant very well, for while collecting it from its awkward situation rather hurriedly, my hunting knife, an excellent tool when one is not in a hurry, slipped and went into my hand quite deeply. *Penstemon canescens* seems to thrive on the level ground in a fairly heavy clay soil just as well as it did in its home on a well drained slope.

I have also collected *Penstemon canescens* in Kentucky and in Georgia. All forms seem entirely hardy.

*Penstemon digitalis*. Because the flowers are white and borne on tall, stiff stems this is a very valuable plant both for garden effect and for cutting, too. There are scarcely noticeable faint purple lines inside the tube.

It is a free and easy grower and can hold its own in meadow grass.

I have it doing well in heavy moist soil near a stream and also in dry ground in full sun. It has been so satisfactory and self sows so freely in both places that I have never been able to decide where it is happiest.

This plant will stand considerable neglect in a wild garden and, when required for that purpose, it will grace a choice perennial border where its handsome white flower stalks are very welcome in June.

*Penstemon dissectus*. As well as being the most beautiful of the strictly eastern species it is also the most unusual in appearance, being the only one in the entire genus of penstemons that bears divided leaves, and they are as finely divided as a fern! Oddly enough, those on the young basal growths are entire.

*Penstemon dissectus* also has the distinction of being not only the rarest of all this genus, but according to Dr. Small, one of the rarest plants in the world! When, a few years ago, I took some pressed specimens in fruit to him at the New York Botanical Garden, he



J. deN. Henry

*Penstemon australis* in the rock garden at Gladwyne



J. deN. Henry

*Penstemon calycosus* on a dry hillside at Gladwyne



J. deN. Henry

*Penstemon digitalis* can hold its own in grass at Gladwyne

told me he had never seen the fruit before. In his "Manual of the South-eastern Flora," p. 1203, he says, "capsule not seen." This was published in 1933.

Dr. Pennell, our foremost authority on penstemons, says it has been found only four or five times and I had to make a second trip to its home to get additional herbarium specimens.

Its distribution is limited to a very restricted area in Georgia, in open pine woods in sandy soil, but it grows there plentifully. In one place I marked off a great drift of it 127 feet long! Here it formed the main ground cover.

The flowers of *Penstemon dissectus* are very large and very handsome. They are colored a vivid purple and white, a showy combination. Fewer flowers, than most usually carry, are borne on the very slender, 18-24 inch stems, and they seem almost like a little flock of butterflies rising from the ferny leaves, an altogether charming effect.

One would think that the cultivation of this delightful penstemon might present some difficulties, but such is not the case, for it has been growing happily here in Gladwyne for about four years.

I have three plants, one growing on the level, one in the rock garden and one on a hillside and each is thriving. When I planted them, I mixed a little sand with the soil, but that is all. In Gladwyne it blooms in June.

*Penstemon hirsutus*. Surely this penstemon must be almost as hardy as the proverbial "rock," for its natural home range takes it well up north into eastern Canada. In its usual color forms, which are pallid lavenders and uncertain whites, it has rather a washed out appearance.

This always seemed a great pity to me, so I set out on numerous occasions in many localities to see if I could find

some plants which bore flowers in more decided colors. My reward exceeded my fondest anticipations, and I now have growing at Gladwyne this fine, almost fool proof plant in a number of handsome and striking color forms.

Undoubtedly the finest of these is a very deep colored one. The external portions of the tube are a rich plum purple, the mouth of the flower is white. The contrast is remarkably attractive. The stems and foliage are much darker green than usual and are nicely shaded with bronze purple. I have also several plants with flowers that are colored a good pink. A well grown clump of either of these, especially the former, is an arresting sight indeed.

These penstemons grow in almost any soil or exposure and can hold their own fairly well in grass.

It comes into bloom in late May or early June.

*Penstemon pallidus*. Where a more dwarf plant is wanted for the rock garden, this would be a good choice.

It makes a smaller rosette of foliage than the others. The leaves are a pale grayish green and the pretty white flowers are carried airily on slender stems. Altogether this is a very pretty and a graceful plant.

It grows just as easily as the others, but being much smaller in all its parts I find it handy to keep it in the rock garden where it is easy to keep an eye on it. It blooms in June.

I found this one on a hillside not far from my home.

*Penstemon Smallii*. In spite of its name this penstemon bears the largest flowers of any eastern species except *Penstemon dissectus*. They are conspicuously colored, too, being a deep lavender and white.

I first saw *Penstemon Smallii* growing on a North Carolina mountain side in a scattered drift of many plants cas-



J. deN. Henry

*Penstemon Murrayanus* in the Southern Garden at Gladwyne



J. deN. Henry

*Penstemon Smallii*

cading down a steep slope. It was in full bloom and its showy flowers made a splendid display.

Its wants are easily satisfied. I have it in sandy, well drained soil in full sun where it thrives nicely.

It was named for Dr. Small.

*Penstemon tubiflorus*. As Dr. Small lists this Penstemon in his "Manual of the Southeastern Flora," I am including it in this list, although it does not come farther east than Tennessee and Indiana.

To the casual observer it resembles *Penstemon digitalis* very closely, both in flowers and in habit of growth and in season of bloom. The flowers, however, lack the purple lines and are absolutely pure white. It is, therefore, to my mind an even more beautiful plant. It seems to be just as hardy and ambitious a grower as that species.

It should be included in every collection, although it is not always readily obtainable.

*Penstemon Wherryi* was collected by Dr. Wherry in the Ozark Mountains four or five years ago, so it is still quite a new plant.

It is rather a dwarf grower and bears white flowers.

My plant, which is thriving nicely, has been growing in my trial garden for less than a year, and I do not feel qualified, as yet, to say much about its hardiness and its adaptability in our climate. However, as all my other plants from the Ozarks do well here, I expect this one will, too.

*Penstemon Murrayanus* surely can vie with the best and choicest species that come from the west. It is, indeed, one of the most beautiful and one of the most striking plants I have ever seen anywhere.

Strictly speaking, it is not an easterner but it comes so near to being so, a native of Louisiana, and it is so utterly gorgeous that I cannot refrain from including it here.

*Penstemon Murrayanus* bears brilliant scarlet flowers that are far more effective than those of *Penstemon Torreyi* or *Penstemon Eatoni lancifolius*\*, because they spread widely at the mouth.

The very pale glaucous green foliage in ample rosettes and the pale sea green stems greatly enhance the vivid red of the flowers and form a perfect setting.

The flowers last long in bloom. They open about the end of the first week in June and thickly decorate the three foot stalks, and so for many weeks the

plants fairly flame one after another.

I have two lots of this wonderful penstemon and both groups are doing well. It seems to be hardy, healthy and easy to grow and surely it is beautiful beyond words.

Of course it is not a "new" plant by any means, it is as old as the "poles," but the gardening world in this country is, alas, woefully slow in appreciating the native treasures that are waiting to be grown in our gardens.

Every penstemon I have mentioned has stood prolonged droughts and none has ever been watered, even in the past abnormally dry summer.

\*The description of this variety has not yet been published.

## Oil Palms in Florida, Haiti, and Panama

O. F. COOK

ONLY two kinds of palms, the coconut and the date, are widely known as of food value, but a third type, the so-called African oil palm (*Elaeis guineensis*), is rapidly gaining in economic importance and eventually may outrank the coconut as the principal source of vegetable oil in tropical regions. Although generally considered as an African palm it may prove to have been a native of Brazil, and its nearest relative, *Alfonsia oleifera*, is indigenous in Colombia, Panama, and the Canal Zone. The nature and extent of the relationship may be seen from the photographs.

Commercial supplies of palm oil have come until recently almost exclusively from West Africa, but extensive plantings of oil palms are being made in the rubber belt of the East Indies, largely in the Dutch colonies, and a general cultivation of the oil palm through most of the tropical countries may be expected. As a palm of the future it is likely to be viewed with increasing interest and studied from various standpoints, botanic and economic.

Tree crops are superior to field crops in not inviting erosion, and palms have advantages over all the branching types of trees. In southern Florida, as in many tropical regions, large tracts of waste land now denuded and fire-swept are capable of being utilized with palms or other trees that protect the surface and permit a gradual improvement of the soil conditions. The native palmettoes of Florida, more resistant to fire and to other extreme conditions than most of the native vegetation, may serve as an example, since these qualities are shared to various degrees by many other kinds of palms.

The fresh pulp of *Elaeis*, from the ripe fruits, has a bright yellow color and an agreeable taste, even in the raw state. Many travelers have reported favorably on food cooked with fresh palm oil in Brazil and in Africa. Monteiro described "palm chop" in Angola as "a delicious dish when properly prepared and from the fresh nut." The native preparation called "dumboy" in western Liberia is made by pounding cooked cassava roots in a large wooden mortar till a stiff dough is formed, and is eaten preferably with "whayne soup" made from the pulp of fresh palm nuts, cooked with chicken. It is an extremely palatable and wholesome food, always remembered with pleasure by those who have lived among the native people.

Since oil palms and cassava can be grown in the Canal Zone and in southern Florida, dumboy and other tropical dishes might become popular, and the labor of preparing the cassava no doubt could be relegated to machinery, like the manufacture of ice cream. The art of making dumboy was described by Collins in the *National Geographic Magazine* for January, 1911.

Palm oil began to figure as a commercial article in the period of the slave trade, that at first was conducted by way of Brazil. Even before the discovery of America, Portuguese missionaries had worked among the natives of the Congo, and the Portuguese colonies in Brazil were the first agricultural settlements in America. The use of palm oil in Brazil apparently goes back to early colonial times. Martius, the chief authority on the palm flora of Brazil, reported *Elaeis* as growing wild along the coast, and similar reports come



Fig. 2. *Elaeis* to compare with *Alfonsia*

from Guiana and Venezuela, of the African oil palm growing in coast districts, but supposed to have escaped from cultivation.

An introduction from Brazil may explain why the oil palm, though used extensively on the Guinea coast in the last century was scarcely known in the interior of Africa when the river systems were explored. It is difficult to believe that a palm so well suited for native use should not have spread across the continent during the prehistoric ages if it had belonged to the African flora.

Palm oil and palm kernels have been the chief exports of West African trade during the last century. The oil was used mostly for making soap and in the manufacture of tin plate, but eventually methods of reclaiming the edible oil were developed. A vegetable butter can be made from the naturally yellow oil without artificial color. Varieties with thicker pulp and thinner shells are being selected for commercial planting in the East Indies, and also in the British and French colonies of West Africa.

The oil palms are members of the coconut family, but form a separate tribe or subfamily, not closely related to the other divisions of the group. The inflorescences are even more compact than those of the *Borinoa* palm described and illustrated in the October number of THE NATIONAL HORTICULTURAL MAGAZINE, but are not enclosed in hard, woody spathes like those of *Borinoa* and the related genera, *Attalea*, *Scheelea*, and *Orbignya*. The oil palms have thin, soft spathes, soon torn into loose, weak fibers. Residues of the fibrous spathes of *Alfonsoa* and *Elaeis* are shown in Figures 1 and 2, below the clusters of fruit.

The nuts of the oil palms are smaller than walnuts, of a short, oval shape, often flattened or distorted from mutual pressure in the fruit head. The fruits

shown in Figure 11 are of unusually large size and regular form. The three "eyes" that characterize all the members of the coconut family are distinctly marked, but located at the end of the nut instead of at the base. The apical foramina and the separate sexes of the inflorescences at once distinguish the *Elaeis* subfamily. Separate male inflorescences and bisexual female inflorescences characterize the *Attalea* subfamily, while in the *Cocos* subfamily all of the inflorescences have flowers of both sexes.

The oily endosperm is a common feature of all the cocoid palms, but only a few have, in addition, an outer pulp that is rich in oil. The so-called peach palm (*Guilielma speciosa*), widely cultivated among the primitive forest peoples of South America, has an edible pulp of a different texture, resembling sweet potatoes or boiled chestnuts.

#### AN ORCHARD TREE IN FLORIDA

The most direct interest in oil palms is for people who live in southern Florida, not the "winter residents," but those who remain through the year and work in their gardens and orchards, wishing to grow as many of the tropical foods as possible, and to learn how to use them. The fruits of temperate climates are replaced by the citrus series, avocados, mangoes, sapodillas, bananas, coconuts, and pineapples. The oil palm may be added in place of the olive, which is not adapted to the humid climate of Florida, or may be viewed as an alternative of butter and animal fats.

Several advantages over the olive may be claimed for the oil palm, in bearing more promptly and freely, in yielding its fruits in very large clusters that greatly facilitate harvesting, and in the fresh oil or fruit pulp being available directly for culinary use. The fruits ripen slowly and remain for several weeks in condition to use. The oil

is reported in Brazil to keep very well if bottled while fresh, not becoming rancid like African palm oil, which is handled in bulk.

#### HARDIER THAN THE COCONUT PALM

The oil palm is slightly more hardy than the coconut and able to grow in Florida as far north as Orlando, instead of being limited to the tropical section below Fort Pierce. An oil palm at Coconut Grove, near the Pan American Airways, shown at the left of figure 4, may be the oldest in Florida, though the palm in a park at Orlando, at the right of figure 4, may be nearly as old. Introductions were received by the Department of Agriculture from the Philippines in 1899, and from the Gold Coast in 1902, but earlier introductions probably were made.

Oil palms as ornamentals are not so stately as the royals, nor so graceful as coconut palms, but in thriving condition are very handsome, and give a strong impression of tropical luxuriance. Though attaining nearly the same size as the royals and the coconuts, oil palms grow more slowly, the joints of the trunk being shorter. A dense crown of deep-green foliage is formed, with more resemblance to the East Indian date palm, *Phoenix sylvestris*, than to other palms now grown in our southern States. The floral specializations, with the sexes in separate inflorescences, but both kinds produced on the same individual, are unique among the palms and of general biological interest. Commercial planting of oil palms in Florida would be premature, but local tests should be made in gardens and grounds with palms of other kinds, to compare their behavior as ornamentals and determine their fruiting habits.

#### TWO OILS FROM THE SAME PALM

A second kind of oil is obtained from the kernels of the oil-palm nut, a clear,

colorless oil, distinct from the yellow oil of the outer flesh of the fruit, enclosing a black nut with a hard shell, like a small coconut. Cracking the nut frees the kernel, the size of a hazel nut, covered with a wrinkled dark skin, but pure white inside like the "meat" of the coconut, and of similar texture. The kernel oil tastes like coconut oil, and is adapted to similar uses. Large quantities of palm kernels are exported from West Africa to Europe and America, in addition to the trade in the yellow palm oil.

Both of the oils undoubtedly would be extracted and used in Florida for local food purposes if the palms were grown in sufficient numbers, but only a gradual utilization of the palm should be expected. The local interest must be sufficient for small plantings of the palms to be made in many places, and for working out the culinary use of the fresh palm oil. Without such experience in raising palms and learning the ways of using the fruit, commercial production could not be approached on a practical footing. Premature efforts of commercial exploitation of new plants not only invite failure through inexperience, but often become serious obstacles in domestic utilization, because popular interest is discouraged.

#### GROUP PLANTINGS TO INSURE POLLINATION

The utility of the oil palm in Florida naturally will depend, as with other tree crops, on finding local conditions where the palms will grow well and yield regularly. Single palms should not be expected to bear good crops, since the flowers may not be pollinated. The sexes are borne on the same palm but in separate inflorescences, and these not close together nor developed at the same time with any regularity that insures pollination. Most of the inflorescences on isolated female palms in

southern Florida have remained completely sterile, but sometimes a few fruits have developed, or small parthenocarps, maturing a little of the oil-bearing pulp, and sometimes with a small seed, but no kernel. In only one case have many fruits developed on an isolated palm.

Self-pollination, from another inflorescence of the same palm, is shown to be possible, since occasional fruits develop on isolated palms, but with three or four palms together the chances of natural pollination by wind or insects are greatly increased. Hand-pollination becomes more practicable to the extent that supplies of pollen are obtainable when required. Also for making a practical experiment in utilizing the fruits, six to a dozen palms should be planted, and in a compact group rather than in a row or an avenue.

#### OPEN LOCATIONS REQUIRED

The oil palm is like the coconut palm in refusing to develop without direct sunlight. Its practical tolerance of shade may be even less than that of the coconut, on account of the seeds being much smaller and the seedlings less able to outgrow competing plants. As with many other palms, the seedlings have simple leaves like blades of grass, so that the young palms usually are not recognized when they come up in yards or gardens, but are hoed or weeded out.

Under forest conditions the seedlings germinate freely and live for many years, but do not grow beyond the early simple-leaved stage. Thousands of oil palm seedlings were seen in 1892 bordering the native pathways for many miles through a forest belt in the interior of Liberia, near the earlier native center of Boporu, but none of the forest seedlings developed. The fresh fruits are carried by the natives as a travel ration and the nuts thrown aside.

The inability of *Elaeis* to grow in the

African forest, and the lack of any report of its occurrence outside of inhabited districts in Africa, leave the question of nativity still open. As an introduced palm it would seem more likely to be adapted and utilized by fishing tribes along the coasts, who use the same village sites for longer periods than people who live in forest clearings. In open country with sufficient rainfall the palms are not dependent on human agency. The oil palms reported as growing wild in Zanzibar and in Madagascar suggest early introductions by the Portuguese, that did not go into use among the natives but maintained a local existence.

Another species, *Elaeis dybowskii*, was described by Hua in 1925 from Libreville in French Congo, but may be only a variant form. The leaves are said to be entire, the fruits subglobose, and the nuts usually 2-celled or 3-celled, but such characters may not require the recognition of a distinct species or indicate a wild state of the palm. Many palms have simple leaves in the juvenile stages or in dwarf individuals, such variations being well known in the coconut palm. The palms in Madagascar were considered by Beccari as a distinct species, *Elaeis madagascariensis*, but his drawings do not indicate an essential difference.

#### OTHER OIL PALMS IN AFRICA

Early references to palm oil in Africa naturally have been interpreted as relating to *Elaeis*, but confusion with other palms is definitely indicated in some of these cases, and is probable in others. The natives of Africa extracted oils from the seeds of several forest trees, including three palms, *Hyphaea*, *Borassus* and *Raphia*, which also were tapped for palm wine. Even *Phoenix* has been confused with *Elaeis*, as in Adam's "Le Palmier a Huile," 1910, a special work on the oil palm.



Fig. 3. Foliage of *Alfonsia*, left; and *Elaeis*, right

The natives of Senegal are said to tap the male inflorescences for palm wine, but the photograph on Adam's page 158 shows a dense thicket of date palms.

Many names for the oil palm in local African languages have been recorded, as in Dalziel's "Useful Plants of West Tropical Africa," but the lists of native names for maize and cassava are even longer, and there is no doubt of these plants being introduced from Brazil. Palm oil and maize ears appear together as items of trade at Dixcove on the Gold Coast in 1750, in "Extracts from the Records of the African Companies," by R. A. Fisher. A Portuguese settlement was made on the Gold Coast in the fifteenth century.

#### OIL PALMS IN HAITI

The failure to utilize the oil palm in the West Indies, after its introduction in the seventeenth century, is in notable contrast with its food status in Brazil and in West Africa. The early writers who refer to the introduction of the palm to the West Indies, as Jacquin, Sloane, and Hughes, reflect the idea of its being of special value for feeding the slaves, but it was not welcomed or adopted among the negroes in the West Indies as a native African food plant might have been. Its reception certainly was different from the other African introductions, as okra, Congo peas, sesame, and grain sorghums, that still are general favorites through the West Indies. Since the palm was introduced in several of the islands, its acceptance as a food was repeatedly tested.

In Haiti, which was the principal market of the slave trade, neglected half-wild oil palms grow as scattered individuals in several places, but only in a single limited area on the north coast of Haiti, between Limbe and Port Margot, are oil palms in regular use.

They are planted or allowed to grow in small groups in several neighborhoods in this district, and oil is extracted in small quantities for local use. Other localities may be found in Haiti or elsewhere where oil palms are utilized on a limited scale. A photograph of a large oil palm in Cuba is reproduced by Beccari in the Pomona College Journal of Economic Botany for May, 1912, but labeled as a native Cuban palm, *Calyptrogyne swartzii*, which Professor Bailey recently has illustrated in the "Gentes Herbarum" as *Calyptrogyne dulcis*.

It is difficult to understand that a native food as popular as the palm oil now is among so many tribes along the African coast was not welcomed and appreciated by the negroes in the West Indies. The only explanation thus far suggested is that the palm may not have had the status as a food resource that it acquired later, but may have been a relatively recent introduction from Brazil to the Portuguese settlements where the slave trade developed. It is known that the contacts of the Portuguese with West Africa during the colonial period were mostly by way of Brazil, and that maize, cassava, yautia, tobacco, and other plants were introduced very early from Brazil, and spread gradually among the African tribes.

Since the natives of Africa had no domesticated tree crops, an introduction of this nature would be adopted less readily than the field crops. Many of the slaves were brought from the interior, and may have eaten palm oil for the first time in the barracoons or on the slave ships, which would account for a negative reaction in the West Indies. The rancid palm oil has an evil taste and smell that naturally would intensify the prejudice of such an association.

Another use of palm oil in the slave



Fig. 4. *Elaeis* at Coconut Grove, left; Orlando, right

trade is stated by Hughes in "The Natural History of Barbados," 1750, of a nature that later might contribute to a prejudice against it.

"This is so universal a Custom, that all the Slaves, brought now from any Part of *Africa* to this, or any of our neighboring *Islands*, are always, before they are brought to Market, anointed all over with Palm Oil, which, for that Purpose, is brought from *Guiney*: Being thus anointed, their Skins appear sleek and shining."

#### THE OIL PALM OF PANAMA

The existence of a native oil palm in the Canal Zone and the neighboring countries, is not without interest in relation to questions of food supplies on the Isthmus for wartime emergencies, or of having palm nuts available to furnish fine charcoal for gas masks. Both of the oil palms might be planted, since *Alfonsia* would grow on wet and partially wooded lands where *Elaeis* would not thrive. The low trunks of *Alfonsia* would facilitate the gathering of the fruit clusters, and the landscape would remain less obstructed to military observation. Although the individual fruits of *Alfonsia* are smaller than those of *Elaeis*, some of the palms produce very large clusters. In *Alfonsia*, as in *Elaeis*, variations with thicker flesh might be found, if attention were given, and might prove valuable. Only 11 per cent of oil was reported from a sample of *Alfonsia* fruits analyzed by a commercial company in 1919, while some of the selected varieties of *Elaeis* have a thick pulp that yields more than 50 per cent of oil.

The oil palm of Panama and the Canal Zone is closely related to the commercial oil palm, and is placed by many writers in the same genus, under the name *Elaeis melanococca* Gaertner, 1788, but differs in several characters

that appear to justify the recognition of the genus *Alfonsia*, proposed by Humboldt, Bonpland and Kunth in 1815. These authorities named and described *Alfonsia oleifera* as a new palm from the Sinu River in Colombia, which apparently is the same species that grows on the Isthmus of Panama. It is reported from the Pacific Coast of Colombia, in the district of Buenaventura, and extends northward to Costa Rica and Nicaragua. The name *Alfonsia* was to commemorate Alfonso of Este, Duke of Ferrara, patron of the poet Tasso and a collector of rare plants.

Structural differences between *Elaeis* and *Alfonsia* may be appreciated by comparing Figures 5, 6, and 11 with Figures 8 and 9. *Elaeis* has short stipitate, fusiform branches on the male inflorescence, very short, flattened female branches, with the flowers and fruits confined to one side, a very long terminal spine, and large spiniform bracts subtending the fruits. *Alfonsia* has longer and more cylindrical branches, the male branches not stipitate, the branches of both sexes swollen and deeply pitted, the flowers not restricted to one side, the terminal spine short, and the bracts not produced into spines.

The trunk of *Alfonsia* is short and usually inclined or decumbent, and the appearance of the foliage is quite different from that of *Elaeis*, on account of the broader pinnae and the greater tendency to droop. Also, the pinnae of *Alfonsia* have a closer and more regular insertion along the rachis, as shown in Figure 3.

The specific name *Elaeis melanococca* apparently is not applicable to the Panama oil palm. The original description by Gaertner gives only seed characters, the shell with a covering of embedded fibers, which is true of *Elaeis*, but not of *Alfonsia*. (See Figures 10 and 11.) Instead of a mucronate apex, Gaert-

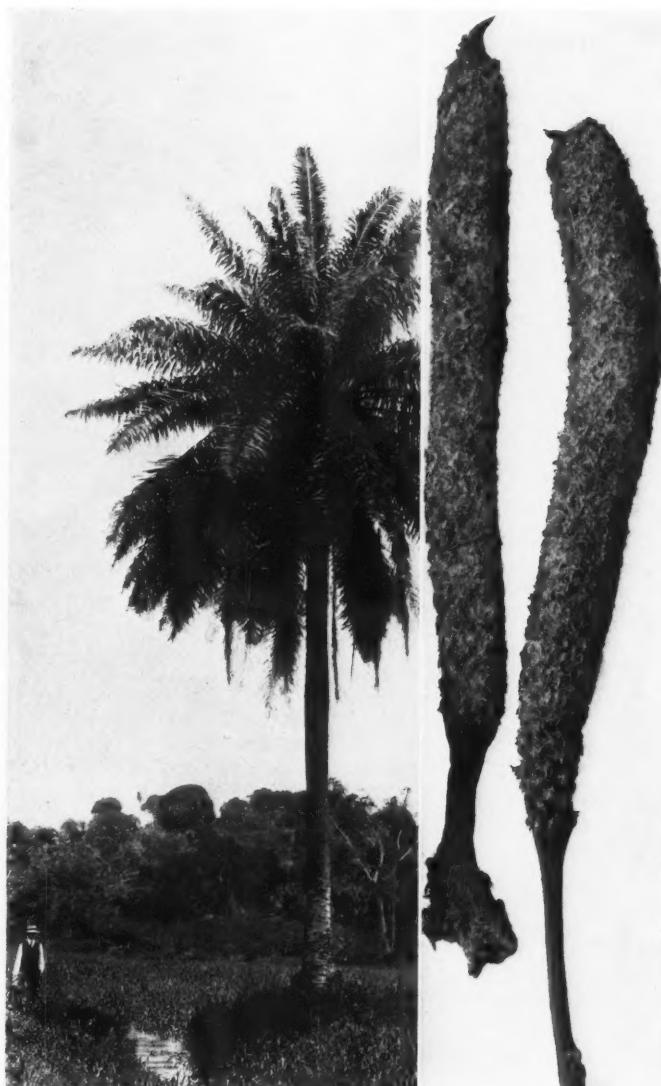


Fig. 5. *Elaeis* in Brazil, male flowers, natural size

ner's drawing shows that the seed was narrowed below, the "eyes" being at the broad end. The name *melanococca* is appropriate for the black fruits of *Elaeis*, but not for the red fruits of *Alfonsia*. The shells of the *Alfonsia* nuts are not black, but rather light grayish brown. The original description states that the seeds are white, as occurs in dried material.

Jacquin described the genus *Elaeis* in 1763 from garden palms in Martinique, at the same time reporting the existence of a similar palm called "Corozo" in the district of Cartagena, with fruits that were used for the extraction of oil. Figures of fruits and seeds were given, which leave no doubt that this corozo was *Alfonsia*, which still is called *corozo colorado* on account of the red fruit. Another corozo described from the Orinoco in 1745 by Gumilla had a tall trunk covered with large spines, probably *Acrocomia*. Gumilla notes two oil-yielding palms, one called "vesirri," with fruits much like dates, possibly *Oenocarpus* or *Jessenia*, the other called "cunama" or "abay," probably an *Astrocaryum*. Two names for the *Alfonsia* palm in Costa Rica are given by Pittier, on the east coast, "quito," and on the west coast, "palmiche." The native name "noli" is associated with *Alfonsia* in Colombia, though often applied to other palms.

#### ALFONSIA AN AUTHENTIC NAME

The suggestion of Professor Bailey that the name *Alfonsia*, published by Humboldt, Bonpland and Kunth in 1815, be replaced by Jacquin's "Corozo," on account of its use by Giseke in the "Praelectiones" of the younger Linnaeus, 1792, seems not to be warranted. Giseke appears merely to have followed Jacquin in recording this corozo from the coast of Colombia as probably representing another genus, distinct from *Elaeis*, but there is nothing

to show that Giseke, any more than Jacquin, proposed to adopt Corozo as a generic name. Giseke's treatment of corozo is reproduced in Figure 8. The printing of "Corozo" in italics, and the absence of a specific name are definite evidence that Giseke was not intending to set up a new genus.

An underlying reason for not adopting Jacquin's corozo as a generic name is recognized in Giseke's note, that corozos mentioned by earlier writers might be different palms. On Giseke's page 42 "corozo" appears in a tabular comparison of Gaertner's classification with that of Linnaeus. Some of Jacquin's notes are transcribed, but the same designation, "Corozo Caribaeis Jacq.", is used, and no species is mentioned. The case of Corozo is in contrast with that of *Avoira*, a genus that Giseke adopts from Aublet and treats in regular form, *Avoira vulgaris* and several other species being named.

Giseke's reference to Jacquin is misleading, since corozo is not given by Jacquin as the Carib name of the palm, but as the name used in the district of Cartagena, an old Spanish settlement. In other words, corozo appears as a Spanish name of the palm, not as a Carib name. Jacquin's plants were largely from Martinique and other Carib islands, French and Dutch, but many were collected in the Spanish colonies. Corozo is one of the plant names that the early Spanish explorers and colonists carried to the continent from the West Indies, as mamey, papaya, guayava, majagua, mani, yuca, cabuya, tabaco, caoba, guanabano, jobo, mais, manaca, ceiba, tuna, and many others. The new American plants had no European names.

The name corozo appears to have belonged originally to the Cuban palm commonly designated as *Acrocomia crispa* (H. B. K.), though recognized as a distinct genus by Morales in 1865



Fig. 6. *Elaeis* male inflorescence, reduced and natural size

under the name *Gastrococos*, alluding to the remarkably swollen trunk. Dalgren's "Index of American Palms" lists many genera and species that are called corozo on the continent. No other popular names except "coco" and "coqueiro" are so widely and casually used for so many different palms in so many countries, from Mexico to Peru.

Most of the corozos are spiny palms, like the Cuban original, but many are unarmed, even the ivory palms being included. The Century Dictionary admits two uses of corozo: "A palm which bears oil-producing nuts, as the *Attalea cohune*, etc.," and "Same as ivory nut." The Oxford Dictionary gives a misleading impression of corozo as having a primary relation to the ivory palms: "A South American tree, *Phytelephas macrocarpa*, allied to the palms," but supported by no reference before 1869. The early reference is to a translation of Ulloa, 1760-72, where "corozo" is neither an ivory palm nor an oil palm, but probably *Pyrenoglyphis*, "a fruit larger than dates of an exquisite taste; and proper for making cooling and wholesome draughts."

Several Spanish dictionaries have *corozo de Guinea* as the name of *Elaeis*. Alcedo's dictionary of South American products, published in 1789, three years before Giseke, says that five kinds of corozo were recognized, one with a thick spiny trunk, felled to obtain palm wine, and another with marble-hard nuts cut into figures of the saints. Alemania considers "corojo" the correct form, and mentions a textile material of that name, the leaves of the Cuban palm yielding a very strong fiber.

Although corozo or corojo is claimed by Pichardo as a native Cuban word, a Spanish origin seems possible by way of "coroza," a word defined in the dictionary of the Spanish Academy as a pointed hood or dunce-cap. The hood-like, long-pointed spathe is a conspicu-

ous feature of the Cuban palm, as of *Acrocomia* and other related types, rather robust palms with spiny trunks and leaf bases, edible fruits, and a sweet fermentable sap. The name "carousier," recorded by Plumier in San Domingo in the seventeenth century, in relation to *Borinoa*, may be a French version of corozo.

Whatever its origin, "corozo" evidently spread from the West Indies as a Spanish word, and the various corozos of Mexico and other continental countries have true vernacular names in each district where the local languages are not extinct. Adopting vernacular names as generic designations is a questionable practice, though generally admitted, but casually misplaced names should be excluded. A genus *Corozo* would be as misleading as a genus "Locust" or "Roble" would be, to replace *Byrsonima* or *Bignonia*. Even if formally proposed, borrowed names like Corozo should not be adopted, on account of the confusion they create. The first essential of a name is that it be distinctive.

#### HABITS OF ALFONSIA AND ELAEIS

The habits of growth of *Alfonsia* are notably different from those of *Elaeis*, the palm somewhat smaller and with only a short trunk, often leaning or prostrate, seldom more than 6 or 8 feet long. *Elaeis* has a thicker trunk, grows erect and becomes much taller, often 30 to 40 feet high. *Elaeis* thrives in Liberia on high sandy beaches exposed to the sea breeze, or in gravelly laterite soils, around the native villages in the coast belt, which have relatively permanent locations. *Alfonsia* in Panama and the Canal Zone is an undergrowth palm, found mostly in swamps or on wet clay slope. It is more abundant in the coast districts, usually in low woods or partial shade, though able to grow in full sun where the ground is moist. A



Fig. 7. *Alfonsia*, mature palm in Canal Zone

few isolated slender-leaved individuals were noticed in dense second-growth forest on the Canal Zone, one of these on Barro Colorado Island.

The remarkable photograph by H. Pittier reproduced in Figure 1 shows a mature *Alfonsia* palm surrounded by undergrowth of the tropical forest, near Port Limon, Costa Rica. Several leaf-bases were cut away in the foreground, leaving the triangular cross-sections. A single male inflorescence stands near the center, with four female inflorescences developed as clusters of fruit bedded in the fibrous remnants of the spathes. In the foreground are numerous detached branches of old female inflorescences. The compact inflorescences add to the peculiar, cycad-like appearance of *Alfonsia*, which is very different from any other palm except *Elaeis*, shown in Figure 2.

The foliage of the two palms is compared in Figure 3, at the left an *Alfonsia* photographed near Cristobal, Canal Zone, March 12, 1915, showing the pinnae closely and evenly spaced, drooping above the middle; at the right a young *Elaeis*, photographed at Bayeux, Haiti, August 19, 1924. The pinnae of *Elaeis* are farther apart, unevenly spaced, inserted at different angles to the rachis, narrow and rather rigid. The mature *Alfonsia* palm with a rather thick irregular trunk, shown in Figure 7, stood at Fort Randolph near the Caribbean shore of the Canal Zone, in June, 1923.

The structural differences between the two genera may be appreciated by comparing the inflorescence branches of the two sexes, *Elaeis* shown in Figures 2, 5, 6, and 11, with *Alfonsia* in Figures 1, 9, and 10. The pedicellate male branches of *Elaeis* and the swollen, deeply pitted, many-fruited female branches of *Alfonsia*, lacking the large needle-like horny bracts of *Elaeis*, are outstanding features. The bracts of *Al-*

*fonsia* are very short and thin, in effect rudimentary.

The fruiting sections of the female branches are notably shorter in *Elaeis*, hardly exceeding three inches, with the terminal spines two inches, the upper branches shorter, but the spines longer, while the corresponding spines of *Alfonsia* are only half an inch long. The axis of the female inflorescence is remarkably thickened in both genera, three to four inches wide with a length of nine to ten inches, the axis as thick as the branches are long, a unique condition. The swelling of the axis doubtless serves to separate the branches and affords more room as the fruits develop.

Crossing the Canal Zone by rail affords an excellent opportunity to see many *Alfonsia* palms in their native habitats. Other pinnate-leaved palms that are visible from the train either grow much taller than *Alfonsia* or are small and slender, with only a few leaves. Thriving individuals have a rather large crown of leaves as in Figures 3 and 7, but usually are low and compact, the general appearance suggesting a cycad, rather than a palm. Only the Panama cohune palm, *Scheelea zonensis* Bailey, is more abundant than *Alfonsia*, and is readily distinguished by its leaves being much larger, more regular and more erect.

Large numbers of *Alfonsia* palms may be seen in partially wooded swamps near Colon and in several places farther south, with one of the best displays near the middle of the Isthmus, on open grassy slopes around the wireless station at Darien. Other groups appear on the Pacific side, surviving in open pastures or on lands that are cleared and cultivated occasionally. The aberrant specimen with the bisexual inflorescence shown in Figure 9, was found a few miles east of the city of Panama, near the site of a former

*Corozo Caribicus Jacq.**Corozo.*

Jacq. Amer. p. 282. t. 171, f. 4. fructus.

*Habitat in territorio Carthagensem.*

De hoc non existat, præterquam quod ex ejus fructibus obtinunturque confitimus Americani in una domesticis, & character fructus, supra p. 42, exhibitus. Ex utroque cum loco natali sulphur, hanc esse eam, quam sub nomine: *Cocos balyraea* Supplementum describit, — nisi forte *Cocos lapidea* *Gardneri* endem cum Corozo sit. — Vix eadem est cum *Loeplini*: Palma cui non enim "Corosa evigata;" iter. p. 253. fuit. p. 326. germ. adh. quem vide.

*Euterpe* Gertn.

1905. *Euterpe globosa* Gertn. Cent. p. 24. t. 9, f. 3. *Pianga* *syliifolia* *globosa*, Rumph. amb. 1. p. 38. t. 5. f. 1. A.

"*Truncus* 4-7. *orgyia* *alta*, *caffior* *quasi* *Pianga* *vulgaris* (h. e. *Areca* 1. *Carheen* *Linn.* v. p. 71.) *amomilla* *lactoribus*, *Ramis* (*frondibus*) *orgyialibus* *vix* *digatum* *caffis*, *haf* *supra* *planis*, *infra* *carinatis*. *Folia* 15-22. *digitora* *longa*, 3. *lata*, *spice* *acuta*, *ne* *abrupta* *ne* *obtusa*, *ut* *reliquarum* *specierum* (*Pianga*). *Racemos* *florifer* *contra* *moorem* *reliquarum* *specierum* *et* *trunco* *ex* *ramificatione* *intervicem* *foliorum* (*frondum*) *prodit*; *simples* *et*, 5-6. *pedes* *longus*, *via* *digitorum* *caffis*; *infra* *et* *pedes* *modus*, *&* *ad* *extremum* *parcer*, *magnis* *tamen* *spinosis*, *in* *quibus* *exteriorum* *florum* *reliquia* *confunduntur*, *obfusas*, *in* *medio* *tantum* *fructus* *gerens*. *Hic* *sunt* *rotundatae* *antra*, *foliopetrum* *globula* *pando* *miijares*, *suprema* *parte* *obtusa*

obtusa *et* *lato* *spica*, *inferiore* *cauda* *tecum* *spina*. *Sub* *terno* *et* *fragili* *piantum* *verus* *teguntur* *antra*, *tempi* *&* *frondas* *inter* *rectas*, *substantia* *ut* *veteris* *Pianga* *alba*, *durius* *tamen* *&* *amorior*. *Liguum* *alascans* *facile* *per* *longitudinem* *filis*, *intus* *medulla* *fungo* *brevis* *filamentis* *innixta*." Rumph. 1. c.

3. *E. piffieri*. Gertn. p. 25. t. 9. f. 3.

Quam huius determinatio a Cl. *Gastavero* & *Collectione* *seminum* *horti* *Lugduno-Batavi* *facta* *est*, *de* *reliquis* *partibus* *nisi* *traderem* *postum*; *nisi* *forte* *sit* *Rumphii* *Pianga* *glandiformis* *g.* *v.* *p.* *72*.

*SAGUS*.

3. *S. Palma-pinus*. Gertn. p. 27. t. 10. f. 1. *Palma* *Pinus* *lobelii* *adversa*, p. 450. DALEGH. *pinus* *lobelii* 1832.

*Exodici* *fructus*; *aut* *arboris* *ramus*, *cum* *fructibus* *spinosos* *Clus.* *cur.* *post.* 82. 84. (edit. in *fol.* 1611. p. 43-44.)

v. *Synonyma* *religia* *l. c.* *in* *quibus* *tamen* *nullum* *est* *Rumphii*, *ne* *ut* *huius* *species* *facta* *cum* *Gertn.* *non* *convenit*.

Inter haec citata *figuras* *Lobelli* *melior* *est* *ill. Clusi*, *huius* *vero* *Descriptio* *præstet*.

3. *S. trunco frondibusque pinatis stipitatis spinosis*, *genus* *foliis* *spini* *inermibus*, *racemis* *erectis*. *Rumph.* *amb.* 1. p. 72. t. xvii.

"*Truncus* 15-20. *pedes* *alta*, *orgyia* *caffius*. *Ramifications* *circum* *radicem* *spinosis* *habet*, *que* *cum* *ita* *ambum*, *ut* *nusquam* *innoxie* *tangi* *possit*, *dunc* *tam* *alta* *&* *caffia* *eraverit*, *ut* *nullum* *ampius* *dannum* *ab* *spis* *pai* *possit*. *Frondes* *dum* *provenit* *ad* *terram* *fieri*

Fig. 8. Giseke's treatment of Corozo

agricultural experiment station, at one time conducted by H. Pittier.

## THE SEXES IN SEPARATE INFLORESCENCES

An unusual phase of floral specialization is presented by the oil palms in having the sexes in separate inflorescences, but with the two kinds of inflorescences borne on the same plant, the only familiar example of such a specialization being the maize, or Indian corn. The related group of palms, represented by Bornoa, has two forms of inflorescences, some entirely male but those that bear the female flowers also provided with male flowers.

In the great majority of palms, the flowers of the two sexes are different in form and structure, but both sexes

are represented in each inflorescence, mingled or grouped together, or the female flowers may be confined to a basal section of the inflorescence branches, and the male flowers to a terminal section.

The flowers of palms show few specializations of shape or color to attract insects and facilitate cross-pollination, but many other floral adaptations may be recognized. Some of the more primitive types, like the palmettoes of the southern States, have perfect bisexual flowers, and some are specialized to the extent of having the two kinds of flowers produced on separate plants, in other words, are definitely dioecious, notably the date palms, pacaya palms, and ivory palms.

The plant as a whole is considered

bisexual if it produces germ-cells of both sexes, although the two kinds of reproductive metamers that produce the germ-cells are as definitely differentiated as the sexes of animals. Separation of the sexes as different individuals is the rule among the higher animals, while most of the higher plants have the two sexes represented in the same individual. The plant has a vegetative development before the sex characters appear, and the two kinds of sex metamers of plants, the stamens and carpels, are formed in definite sequence and often in definite numbers, as in the many regular types of flowers. Yet many other plants have the stamens and pistils in separate flowers, some in separate inflorescences, and some on entirely separate plants. Secondary sexual characters among plants are confined to the monoecious and dioecious groups, unless the characters of the floral envelopes are considered.

#### PROBLEMS OF SEX DETERMINATION

How the characters of the internode individuals are changed, so that the pronounced and contrasted differences appear in successive units of the same plant, is still unknown. The sex differences arise through changes of characters between successive internode-members of the plant body, apparently in the same manner as the changes between different kinds of vegetative members. From the nature of the plant body, the germ-cell explanation of the sexual diversity of animals would not apply to the plants that produce both kinds of sex-metamers on the same individual. Evidently there are different systems of producing the contrasts of the sexual characters.

In the life of a dioecious plant a single determination of sex may be supposed to take place, and that at the beginning of embryonic development, as with the higher groups of animals,

while in a monoecious plant like *Elaeis* or *Alfonsia* a series of sex-determinations is called for, in advance of the development of the successive inflorescences. Among the synoecious palms the sex-determinations are deferred longer, and are vastly more numerous, to govern the development of the individual flowers. In the autoecious groups, a change from one sex to the other occurs during the formation of each individual flower, between the stamens and the pistils. That the same palm produces both sexes does not mean that no determination of sex takes place, but requires a more specialized form of determination, capable of frequent alternation.

The production of the two kinds of inflorescences in the monoecious palms might also be considered as an alternation of sex, and from that point of view may be worthy of special study and comparison with sex-specializations in other groups of plants, to learn whether the sex-sequences are the same and how the changes are determined or controlled. It seems not impossible that such alternations might be influenced by external conditions or by fertilizers applied to the soil. In the event that chemical differences between the sexes of dioecious plants can be established, as sometimes reported, knowledge of such reactions doubtless would assist in the study of sex-differentiation among the palms.

Many writers have placed emphasis on problems of sex determination in the belief that knowledge of this function might afford a special clue to an understanding of heredity. The fact that many other characters are joined with sex, either in transmission or in expression, would seem to support the idea of special significance of sex characters from the standpoint of heredity, though no general principle of sex determination seems to have been estab-

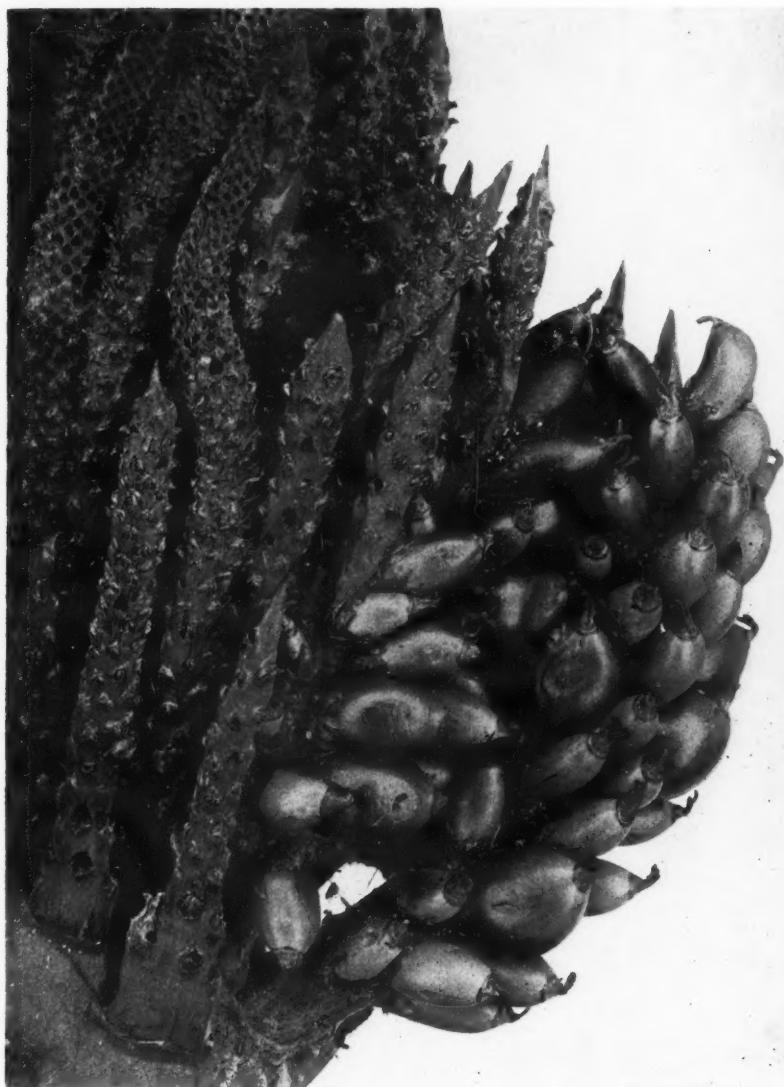


Fig. 9. *Alfonsia*, bisexual inflorescence, natural size

lished. It may be said of some of the sexually differentiated plants, as of the many groups of animals, that the sexual characters are the greatest differences that appear among the members of the same species, and there is the same reason to expect that the study of sex differences among plants will afford additional insight into the processes of heredity.

#### A BISEXUAL INFLORESCENCE

The finding of an *Alfonsia* palm bearing abnormal bisexual inflorescences, has been noted. These inflorescences are bisexual in having flowers of both sexes, but not in the manner of *Bornoa*, since the branches with many female flowers have the male section suppressed. An inflorescence from this palm, shown in Figure 9, was composed chiefly of normal male branches, but a few branches near the base had female flowers and fruits.

Some of the fruit-bearing branches were normally male at the tip but produced near the base a few small abortive fruits, while other shortened branches went over more completely to the characters of the female inflorescence, producing normal full-sized fruits. The cavities shown near the base of some of the otherwise normal branches indicate a slight development of the female flowers that normally are completely abortive, but *Alfonsia* has no constriction of the branches to separate the male flowers from the abortive female flowers, as shown for *Elaeis* in Figures 5 and 6. The normal male branches of *Alfonsia*, shown in natural size in Figure 10, attain a length of 8 or 9 inches. The female branches are about half as long, but much thicker.

The changes from male to female characters that normally would occur between the formation of successive inflorescences had in this case taken place

while a single inflorescence was being formed, which thus showed intermediate stages in the expression of characters that normally would appear in complete contrast, on separate inflorescences. The extent of specialization involved in the separation of the sexes is better understood by considering the readjustments that are necessary in passing from one set of specializations to another.

To appreciate the interest of such variations, it is necessary to take account of the specializations of sexual characters that have developed in the several groups of palms, and of the relations of these specializations to each other as forming a remarkably complete series. Some of the palm groups remain unspecialized, with the flowers and the inflorescences all equal and alike, while other groups show intermediate stages, leading to extreme specializations. The sexual differentiation of the flowers may be carried to a great extent without the sexes being separated on different plants or on different inflorescences, but the greatest differentiation of the flowers and inflorescences is in the groups that have the sexes on separate plants. The tendency of the sexes to separate and to become diverse apparently has worked out independently in several groups of palms.

#### FLORAL SPECIALIZATIONS OF PALMS

In other groups of plants much study has been given to floral adaptations from the standpoint of cross-pollination, and many remarkably specialized characters have been described. Darwin and many of his successors have investigated floral specializations from the standpoint of evolution; but most of the palms are wind-pollinated, so that the same selective significance is hardly to be ascribed, to explain the differences in floral characters. Yet the

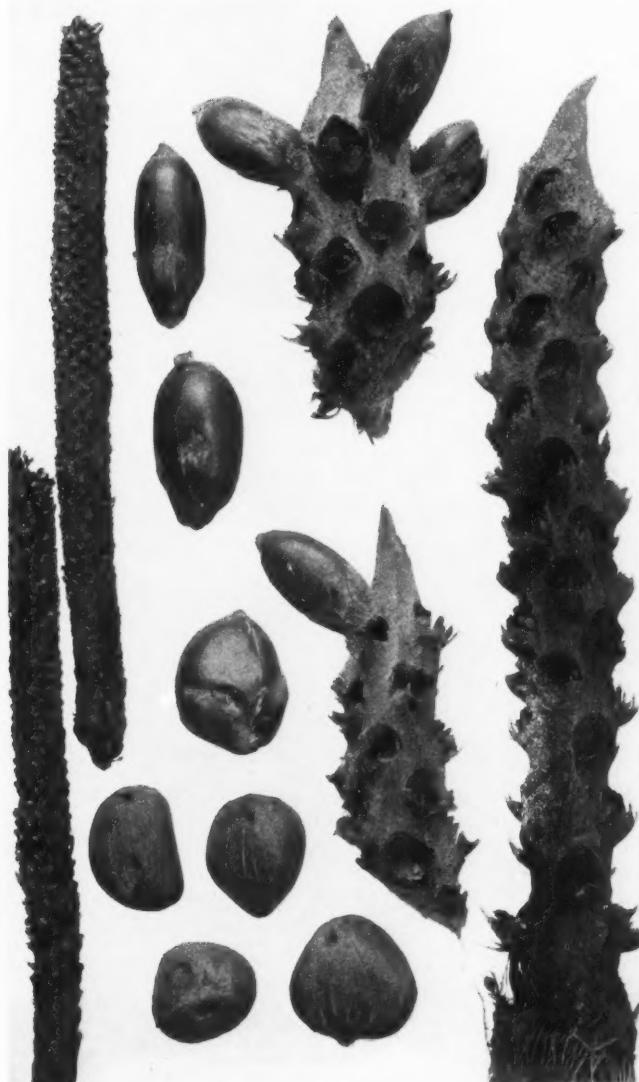


Fig. 10. *Alphonse* male and female branches, fruits, and nuts, natural size

floral differences among the palms are directly comparable with those of insect-pollinated groups.

Four general categories or stages have been recognized in describing the sexual specializations of plants, as to the presence of both sexes or of only one sex on the plant individual, and the manner of association of the sexes when both are present. All four stages of specialization are represented among the different groups of palms, and may be defined as follows:

*Autoecious*, having the two sexes represented in the same flower, with the stamens and pistils both fully developed and functional, thus constituting a bisexual or perfect flower. This primitive condition of unspecialized flowers is represented among the palms by the palmetto family (*Sabalaceae*) including the cabbage palmetto of the Southern States and several related genera in tropical America.

*Synoecious*, having the sexes in separate flowers, but the flowers of the two sexes produced on the same inflorescence. This is the general condition among several of the larger families of palms in tropical America, as in the coconut family, *Cocaceae*, the royal palm family, *Acristaceae*, and the fish-tail palms, *Geonomaceae*.

*Monoeccious*, having the sexes in separate inflorescences, but the two kinds of inflorescences on the same plant. The monoecious palms are limited to *Elaeis* and *Alfonsia*, in the family *Cocaceae*, and to a few genera of the stilt-palm family, *Iriartaceae*.

*Dioecious*, having the sexes on separate plants, in addition to the separation of the sexes in the flowers and in the inflorescences. The date palms, *Phoenixaceae*, ivory palms, *Phytelephantaceae* and pacaya palms, *Chamaedoreaceae*, are regularly dioecious.\*

#### SEQUENCE OF STAMENS AND PISTILS

The central location of the pistils, as a general feature in the structure of bisexual flowers, may be interpreted as a terminal position on a short determinate branch. A succession of different kinds of metamers, as bracts, sepals, petals, stamens, and pistils, is represented in each flower, often with secondary specializations among the members of the several classes of metamers, though such differences are found in relatively few cases among the palms.

The positional relation of the stamens and pistils may be taken to indicate that the primitive sequence of determination was always the same, with the stamens in advance of the pistils. This morphological reckoning would suggest that all cases of protogyny, where pistils are functional in advance of the stamens of the same flower, might be viewed as specializations in the direction of a separation of the sexes.

The positional priority of the stamens seems consistent with the idea that the vegetative metamers of plants were developed originally from stamens, and on that assumption the body of a bisexual plant might be considered as male to the time of flowering. On

\*These terms are derived from the Greek word *oikos*, meaning house, used in reference to the flowers. The literal meanings of the compounds may assist in associating them with the specializations found among the palms. *Autoecious*, meaning "same housing," signifies that the sexes are in the same flower; *synoecious*, "housing together," that flowers of the two sexes are associated; *monoeccious*, "separate housing," that the sexes are in different inflorescences; *dioecious*, "housing apart," that the sexes are on different plants.

The term *monoecious* often is used to include *synoecious*, that is, to cover all cases where the flowers are of separate sexes but borne on the same plant. Under that terminology, the palms with inflorescences bearing the two sexes of flowers could be described as *synapadic* and those with the sexes in separate inflorescences as *disapadic*. The term *synoecious* has been used in reference to the compositae which have flowers of the two sexes in the same head. The placing of the sexes in separate inflorescences as in the maize plant is the feature that usually receives attention when monoecious plants are discussed. The monoecious palms are like the dioecious palms in having two kinds of inflorescences as well as two kinds of flowers, but the dioecious palms have two kinds of individuals.

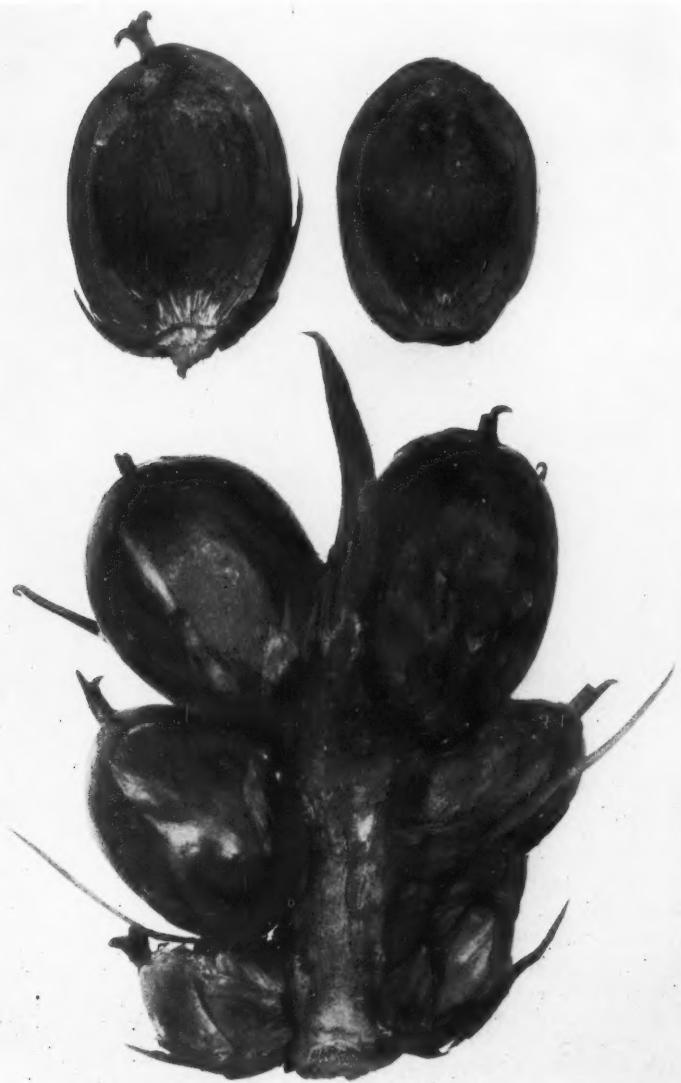


Fig. 11. *Elaeis* inflorescence branch with mature fruits, natural size

the other hand, it may be argued that a structure built up by the subdivision of conjugating sex-cells is essentially of the nature of a sex-hybrid, which comports with the idea of bisexual flowers as a more primitive condition than the separation of the sexes.\*

#### SPECIALIZED POSITIONS OF FLOWERS

In the different groups of palms many specialized positional relations are shown in different arrangements of the flowers of the two sexes, in addition to the sharply contrasting differences of the flower size, form and structure. Each of the specialized arrangements may be considered as a different adjustment of the factors that determine the sex of the floral rudiments in relation to their position.

Flowers of both sexes may be scattered over the branches of the same inflorescence, or the female flowers may be confined to the base of the branches. Each female flower may be accompanied by two male flowers, while other male flowers farther up the branch may be in pairs or single. The inflorescence of the coconut palm shows an extreme reduction in the number of female flowers. Most of the branches have only one female flower, though some have two, while many of the branches have male flowers exclusively. The Central American genus *Synechanthus* and its relatives form a special group of palms characterized by having the male flowers arranged in longitudinal rows along the very slender branches of the inflorescence, with a single female flower at the lower end of each row of male flowers.

It might be supposed that the different positions of the flowers on the branches of the inflorescence would have adaptive significance in relation to fertilization, but apparently this is not

the case, since the male flowers usually shed their pollen well in advance of the maturity of the female flowers of the same inflorescence. The time adjustments determine the possibilities of crossing, whether the sexes stand apart or together on the inflorescence. Palms are largely wind-pollinated, though many have fragrant flowers that attract insects.

The tendency in several groups of palms to restrict the female flowers to the basal portions of the inflorescence may be ascribed to the more sheltered position and to readier access to food supplies through the vascular system of the plant. Also, the spreading of pollen by the wind would be more effective from male flowers at the ends of the branches. Both of these adaptive factors would favor the separation of the sexes, through natural selection.

Slower development of the pistillate flowers may make it possible for female inflorescences to be fertilized by pollen from male inflorescences of the same plant. An isolated *Elaeis* palm at Coconut Grove, Florida, produced three full-sized clusters of fruit in the spring of 1932, which apparently had been pollinated from a following series of five male inflorescences. The sexes are said to appear in variable "cycles" in the East Indian plantations of *Elaeis*.\*

#### DIFFERENCES DERIVED THROUGH SUPPRESSION

The abnormal inflorescence of *Alfonsia* shows how the monoecious state,

\*See: BUNTING, B., B. J. EATON, and C. D. V. GEORGI. The Oil Palm in Malaya. *Malayan Agricultural Journal* 15:330-331. October, 1927. ". . . A 'female' cycle, during which only female flowers are produced and which usually lasts for a period of three months, sometimes six months, is followed by a resting period of three months, and then a 'male' cycle of about the same length as the 'female' cycle. These cycles are not seasonal, and both male and female cycles may occur at the same time on different palms. Instances have been recorded in which both mature male and female flowers appeared together on the same palm, but such occurrences are comparatively rare."

A few abnormal individuals are reported, with all the inflorescences of one sex, but the female palms are "invariably sterile."

\*COOK, O. F., and W. T. SWINGLE. Evolution of Cellular Structures. Bull. 81, Bureau of Plant Industry, 1905.

with the sexes in separate inflorescences, could have been reached from conditions found in some of the synoecious palms, those that have both sexes represented, but with the female flowers restricted to basal sections of the branches. The male inflorescences of *Alfonsia* have rudiments of female flowers at the base of the branches, and these rudiments are enlarged and made visible on the shortened branches of the abnormal male inflorescence, as shown in Figure 9. Complete suppression of female flowers on some of the inflorescences and of male flowers on other inflorescences would result in the specialization of two kinds of inflorescences, as in the oil palms.

The female branches of *Alfonsia* and *Elaeis* are much shorter than the male branches, no doubt for the reason that they represent only the basal portion of a primitive bisexual branch, the terminal male portion of the branch being suspended. The branches of the female inflorescence of *Elaeis* (Figure 11) are relatively much shorter and the flowers and fruits on each branch are much fewer than in *Alfonsia*. (Figure 10.)

In the abnormal inflorescence (Figure 9) some of the male branches which are adjacent to the female branches are shorter and thicker than the normal male branches. Also the shortened male branches are seen to be thicker toward the base, and a partial development of female flowers is indicated by several large pits. The normal male branches also have rudiments of female flowers at the base, but more completely suppressed.

The normal separation of the sexes in these palms appears to be accomplished by a more complete suppression of the sex alternatives than is shown in the abnormal branches. If the female or basal part of the branch develops, the male or terminal part is suppressed,

while a suppression of the female part of the branch allows the male part to develop. Reckoning from a primary bisexual condition, the determination of sex is accomplished by the suppression of the characters of the opposite sex.

The alternative relations of the sexes on the inflorescence may be determined in the same way as the presence or absence of stamens or pistils in the flowers. The general effect of specialization has been to reduce the number of determinations of sex and to place them farther apart in the life history of the plant. The physiological problems of reproduction and development doubtless are simplified by separation of the sexes.

The development of a stronger terminal spine on the intermediate branches of the abnormal inflorescence renders them more similar to the male branches of the African oil palm, shown in Figures 5 and 6, and suggests that the terminal spine character of the male branches in *Elaeis* may be a carry-over from the terminal spine of the female branches, though a metaphanic relation of the spine of the female branches of *Elaeis* to the pedicel of the male branches is an alternative possibility. Metaphanic assimilation or interchange of characters is not necessarily limited to sex differences or to strictly homologous features. The peculiar spine-like bracts that subtend the fruits of *Elaeis*, as shown in Figure 11, may be derived from the terminal spine by anticipation of spine characters in the bract metamers.

The male branches of *Elaeis* appear more specialized than those of *Alfonsia* in having a slender pedicel-like base and a more compact and thicker floral spike, Figures 5 and 6. Rudiments of female flowers are perceptible close to the base of the male branches, and these rudiments are separated from the male

flowers by the slender smooth pedicel, a feature not indicated in *Alfonsia*. The female flowers and fruits are much less numerous in *Elaeis* than in *Alfonsia* and are restricted to the outer face of the branch, leaving the flattened inner face naked, as in Figure 11. The thicker and more cylindrical, deeply pitted female branch of *Alfonsia*, shown in Figure 10, bears fruit on all sides, at least in the upper part.

#### SUPPRESSION OF STAMENS AND CARPELS

As in other groups of plants, the changes from bisexual to unisexual flowers presumably are accomplished by suppression or reduction, the pistils being suppressed in forming the male flowers, and the stamens suppressed in forming the female flowers. Also the tendency to suppression in the female flowers of many groups of palms extends to a more or less regular abortion of two of the three carpels in each of the female flowers, so that only one carpel develops and only one seed is produced.

In a few groups of palms the three carpels are equal, so that two or three seeds often are developed from the same flower, but in most of the sexually specialized palms only one carpel of each female flower produces a seed. The fertilization of one carpel has the effect of inhibiting the development of the others, though if none of the ovules is fertilized a partial development of all three carpels may take place. In the coconut family the three carpels are always represented in the fruit, being fused together to form a compound pericarp, but in most of the Cocoid genera only one carpel is fertile, and only one seed develops. Different degrees and stages in the suppression of the abortive carpels of the female flowers may be distinguished. The carpels may be equally developed when the

flower opens, or the fertile carpel may be much larger than the others, even in the bud.

#### REDUCTION OF INFLORESCENCES

The sexual specializations of the palms are accompanied by simplification and reduction of inflorescences, affording greater protection of the reproductive system. Two courses of adaptation may be recognized, of increasing the size of the protective envelopes and of reducing the bulk of the inflorescence that the envelope must contain. From the primary stage of slight protection of the flowers by numerous small spathes, progress has been made to the most specialized groups that have one or two of the spathes greatly enlarged and enclosing all the rest of the inflorescence to the time of flowering.

The enlargement of a few of the basal spathes usually has been accompanied by a reduction of all of the other spathes to a rudimentary size. The largest spathes known are only 4 or 5 feet long, while some of the primitive palms with bisexual flowers have compound inflorescences 10 feet to 15 feet in length at the time of flowering. These huge ramifying inflorescences have hundreds of small spathes, but the flowers are only imperfectly protected because the branches emerge at an early stage of development and the flower-buds often are completely destroyed or sterilized by unfavorable weather, disease or insect pests.

On this basis the palms that have the inflorescences reduced to a cluster of short simple branches, as in *Elaeis* and *Alfonsia*, would represent rather advanced stages of specialization. In a few palms the reduction of the inflorescence has taken another course, toward suppression of the branches, and this may be carried to the point of reducing

the inflorescence to a simple axis. Such cases occur in several groups of palms, some that have flowers of both sexes together, as among smaller members of the Cocaceae, and also among dioecious palms, as *Phytelephas* and *Chamaedorea*.

With the spathes developed to the extent of affording complete protection to the time of flowering, the sepals and petals of the male flowers are no longer needed, and may be replaced by larger numbers of stamens. Such reductions of the floral envelopes have occurred in several groups, notably among the ivory palms where the male flowers have only minute rudiments of the calyx and corolla, but have stamens by dozens and hundreds. The male flowers of the species of *Attalea* are too narrow to enclose the stamens, and in one of the royal palms, *Gorgasia oleacea*, the petals are shorter than the filaments, so that the anthers are extruded beyond the petals even before the spathe opens.

In several Oriental palms, as *Seaforthia*, *Archontophoenix*, *Loroma*, and *Eora*, the protective functions of the spathes are supplemented and replaced by the long, sheath-like base of the leaf,

which remains in place during the development of the inflorescence. When the flowering stage is reached the swelling of the inflorescence splits the protecting leaf-sheath, which then falls off. The spathes of these palms are thin and membranous in texture, without chlorophyll, and remain in place only a few days after the leaf-sheath has fallen.

Further examples might be given of specializations that have accompanied the development of separate sexes among the palms, though the adaptive advantages appear in other features, rather than in the differences between the sexes. The lack of adaptive significance in specialized sex characters was recognized by Darwin as a difficulty in the theory of natural selection. Sexual selection was thought to explain the development of sex contrasts among the higher animals, but the plant sexes are beyond the range of such reasoning. Other views of evolution must be sought through the study of specialized characters in the various natural orders. The palms are relatively simple plants and have an obvious unity of plan which greatly facilitates the comparison of specialized features in the several families.

## The Lava Beds of Idaho

ROBERT M. SENIOR

THE State of Idaho presents a great variety of scenery. High mountains, some of them 11,000 and 12,000 feet, spread over a great part of the country. Often, at the foot of these mountains, one beholds splendid irrigated valleys of considerable extent. Toward the southern part of the State, the mountains are lower, and gradually merge into a rather monotonous plateau, on which there is practically no rainfall in summer, and the grey sage brush (*Artemesia tridentata*) covers the land as far as the eye can see.

On this southern plateau there are a number of localities where in ancient times there was considerable volcanic activity, some of it taking place less than a thousand years ago,—naturally a rather recent date in geologic history. In such sections as the so-called "Craters of the Moon,"—now a National Monument,—the effects of volcanic eruptions can be observed in the craters, spatter and cinder cones, bombs and lava flows.

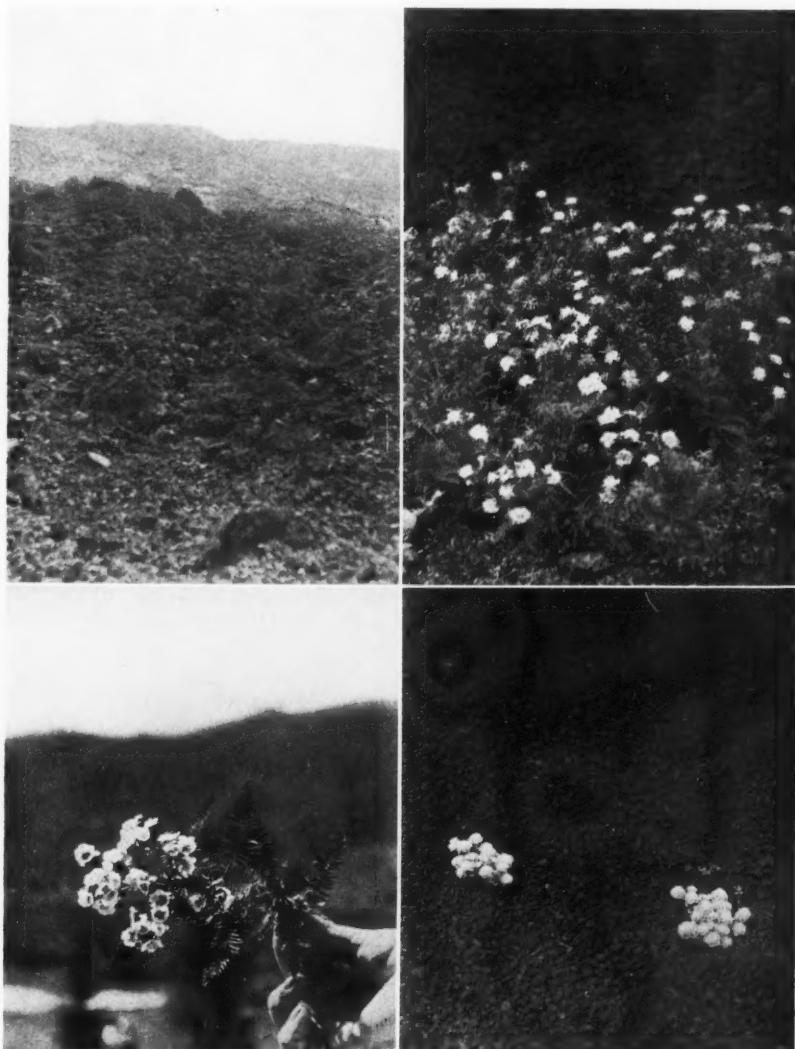
Last year the writer had the opportunity of visiting a number of localities subjected to these ancient upheavals, and to study the vegetation growing on them. Upon approaching one of these areas, it looks like an enormous coal field, interspersed with small daubs of green. If the visit is at high noon in midsummer, the intense heat under a brilliant blue sky almost makes the spectator gasp for breath. The thought flashes through his head,—"how can anything grow in this heat blasted country?" And yet trees, shrubs and herbaceous plants manage to exist,—not in large tracts, but scattered here and there over the landscape.

In these lava fields are numerous

deep depressions and caves, where, to the amazement of the visitor, ice often covers the walls. Imagine going from the surface, where the temperature is probably over 100 degrees in the shade, down into a cave where nothing grows, and the thermometer never registers above 40 degrees. During the cold winters, ice usually forms, and remains possibly throughout the entire summer.

In one section, black cinders may lie on all sides, and to the surprise of the visitor, rising from it, may be found a few straggling limber pines (*Pinus flexilis*). On the ground, spaced a few feet apart, seldom in large clumps, in striking contrast to the black cinders, hundreds, even thousands of tiny plants, with possibly the whitest leaves to be found in all Nature, dot the landscape. This plant is a low Mountain Buckwheat,—the smallest I have ever found,—and is called *Eriogonum deppressum*. Rising about five inches above the leaves are erect little stems bearing creamy yellow flowers, often tinged with red. Some of the seeds of this eriogonum we brought home, and tried to raise in a coldframe. They germinated, but the ensuing leaves lacked the intense white color of their parents. Like the Edelweiss, when brought down from its native mountains, and raised in the lowlands, the plant presented a rather dingy appearance.

Although we arrived too late in summer to see *Lewisia rediviva* in bloom, we were told that in June it could be found in considerable profusion, and that the flowers generally had white petals, whereas those that I had found in other sections were generally rose color. Conversely *Chaenactis Douglasi*, with its grey, finely divided leaves, had



Upper left, The country; upper right, *Chamaebatiaria millefolium*; lower left, detail of last; lower right, *Eriogonum depressum* on lava bed

rather rich pink flowers, whereas elsewhere I had only found white varieties. No doubt here too the lava soil had

affected the color of the flowers.

Although an endless number of penstemons grow in these mountain

States, I could only find one species on the lava rocks,—namely the white flowered *P. deustus*,—a plant about fifteen inches high, each flower rather small, but the mass effect rather attractive. This species I have had in my garden for a couple of years, but whereas it is a firm erect plant in its native habitat, here it is inclined to be somewhat straggly, very likely due to the heavier summer rainfall.

I find that most people have the impression that the monkey-flowers grow only in fairly damp soil, which is certainly true of those two yellow monkey-flowers that we see occasionally in eastern rock gardens,—namely *Mimulus Langsdorfi* and *primuloides*; but here on the lava beds, growing in dry rocky places, we find a charming low annual mimulus, which I have never seen in any rock garden, namely *M. nanus*, with its rich raspberry colored flowers and a brownish throat. We brought back seeds of this plant, and if it thrives, it should be a charming acquisition to the rock garden.

Anyone who has visited arid regions in our western States has no doubt encountered some species of mentzelia, which seems able to withstand the longest of summer droughts. On these lava beds grows a species, *M. multiflora*, about two and a half feet high, with very large light yellow flowers and numerous long stamens that give the rather bushy looking plant an attractive appearance. Like all these western mentzelias, the greyish-green leaves feel rough and hispid to the touch.

We generally have the impression that delphiniums require a fair degree of moisture, and yet on these arid wastes we came across a few specimens that had managed to survive. At the time of our visit the flowers had already begun to fade, so we were not

certain of the species, but it seemed to bear a close resemblance to *D. Nelsoni*, which is also found in the neighboring States of Utah and Wyoming.

Of the ferns, the only one encountered was a charming woodsia, *W. oregona*, which I had also seen in New Mexico. Here it was growing in the shady crevices, with so little soil covering the roots that one wondered how it could possibly sustain life.

The most common shrub in this region is probably *Purshia tridentata*, a rather low bush with yellow flowers and small trident like leaves. *Philadelphia Lewisii*, which is the State flower of Idaho, though rather plentiful elsewhere in Idaho as well as in the neighboring States, only managed to exist here and there in lava crevices. Though having masses of attractive medium sized flowers, it really cannot compare with some of the magnificent hybrids that we now have in our gardens.

The outstanding flowering bush in midsummer is one that we found nowhere else in Idaho, and apparently has no common name, but bears the rather formidable one of *Chamaebatiaria Millefolium*. Its interesting leaves are as finely cut as those of any fern, and toward the top of the stems it bears large panicles of pure white flowers. The stems are very sticky, and no doubt enable the plant to withstand evaporation of water. If this species could adapt itself to eastern gardens, it would be a distinct acquisition. Next year I shall attempt to raise it from seed but my hopes of success are not very high.

As we left this country, we looked back over the black expanse of rock and cinders, and wondered at the hardiness of these plants that could resist the intense cold of winter as well as the terrific heat and the well nigh rainless days of summer.

## The Unusual Grape Ferns

WARREN C. WILSON

PROBABLY our least known native ferns are the Grape Ferns, or Botrychiums. While hiking in the fields and woods during summer and fall one can find several species of these interesting plants. In the fall it is easier to locate the evergreen Grape Ferns, because at that season the frost has browned the grass and brought down the leaves. Earlier in the year Grape Ferns are apt to be overlooked; their relatively small size often causes them to be lost in the mass of other vegetation.

The Grape Ferns belong to the family *Ophioglossaceae*. They, like other ferns, reproduce by means of spores which are borne on modified fronds in sporangia (spore cases). These spores fall to the ground, are carried below the surface by rain water and germinate there. Small, fleshy bodies (gametophytes) form and the Grape Fern, as we think of it, grows from this underground body. A plant established in a favorable location may live for many years. Although countless millions of spores are produced annually, only occasionally does one find the proper environmental conditions and escape the numerous mishaps which may occur and finally complete its long and complicated life cycle.

There are several characteristics which readily distinguish Grape Ferns from other ferns. They normally put out only one frond a year. The sporangia are borne on a separate stalk which arises from the base of the plant or, in some kinds, where the sterile frond is attached to the stem. The roots are fleshy and very little branched. These are a few simple differences which anyone can observe; there are also many technical distinc-

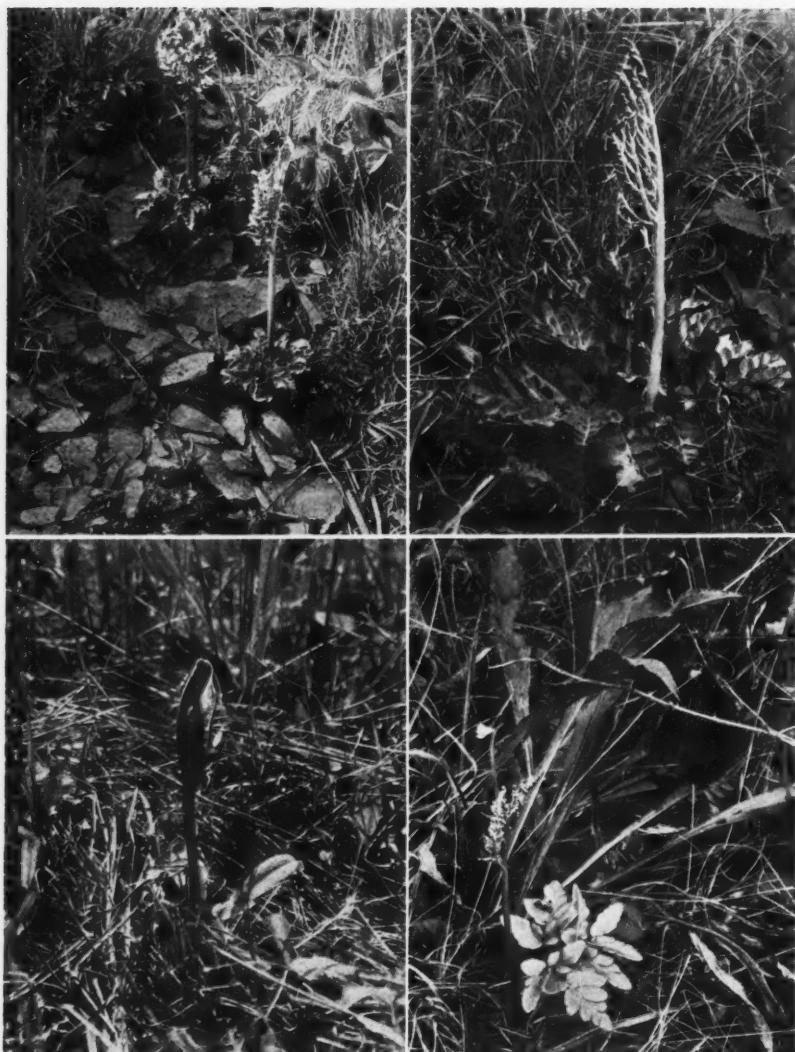
tions which are more difficult to discern.

Grape Ferns occur all over the world. The following kinds are native to the New England and Middle Atlantic States. Some, depending on the species or variety, are found in other states and countries.

The giant of the group is the Rattlesnake Fern, *Botrychium virginianum*. It is the commonest and the one known by most persons. Rarely growing in sunny places, it is frequent in rich, moist woodlands. The broad, delicate fronds, light green in color, are often held a foot or more above the ground. The fertile spike arises from the base of the sterile frond and is some eight or ten inches in length. The spores are shed in late May or June and the plant disappears within a few weeks usually, not to reappear until the following spring.

The Lance-leaved Grape Fern, *B. lanceolatum* ssp. *angustisegmentum*, with a tongue-twisting scientific name, is one of our smallest. It is found in damp, grassy woodlands, in most cases, and is rather infrequent. This fern often grows with the Matricary Grape Fern, *B. matricariaefolium*, which is about the same height — four to six inches. The former has noticeably three-parted sterile blades, whereas the latter tends to be pinnately divided. In both these species the spores mature in late June or July. The plants of the Lance-leaved Grape Fern are visible until frost cuts them down in the fall; the Matricary Grape Fern almost always disappears before this time.

One of the most intriguing and oft-hunted members of the family is the Adder's Tongue, *Ophioglossum vul-*



Warren C. Wilson

Upper left, *B. dissectum* var. *obliquum*; upper right, *B. multifidum* var. *salaifolium*; lower left, Immature plant of *Ophioglossum vulgatum*; lower right, *B. dissectum* var. *oneidense*.



Upper, The Oak Fern, in the writer's garden; lower, Two somewhat different forms of the common Grape Fern



Warren C. Wilson

Left, *Botrychium multifidum* var. *salaifolium*; upper center, *B. dissectum* with intermediate cutting; lower center left, *B. dissectum obliquum*; right, *B. dissectum*; right, *B. dissectum* var. *oneidensis*

gatum. This really tiny fern is quite rare, but in suitable locations it sometimes forms large colonies. I have seen it only a few times, always among the grasses of a damp meadow or pasture. Its single, yellowish-green undivided frond and odd fertile spike are very difficult to locate, unless one crawls about on hands and knees. The Adder's Tongue reaches maturity in June or July and then withers until the next season.

In this region there are two widely distributed species of Grape Ferns which are "evergreen"—*B. multifidum* ssp. *salaifolium* and *B. dissectum* (and its varieties). The former, the Ternate

Grape Fern, is a robust-looking plant with light green, leathery fronds. The segments of its blade are decidedly rounded; in *B. dissectum* they tend to be more pointed. The latter is called the Cut-leaved Grape Fern and is perhaps the most beautiful of them all. Sometimes in extreme forms its fronds present an almost frilled appearance, they are so finely cut. *B. dissectum* var. *obliquum*, the Common Grape Fern (which, by the way, is not so common as its name indicates), is similar but has less divided blades. *B. dissectum* var. *oneidense* has even fewer divisions.

These four Grape Ferns are frequently found together, or very near

each other. Old sterile fields and pastures, dry or moist woodlands, and swampy places are common habitats for all but the var. *oneidense*, which is confined mainly to moist, rich woodlands. This variety and *B. multifidum* usually keep their green color throughout the year, the others often become bronzy in the fall. All of these ferns vary in height from a few inches to a foot or more. The spores of the Ternate Grape Fern are released in August and September; those of the other kinds are shed a month or two later.

The botanists have long disputed among themselves as to the proper scientific names for the *B. dissectum*

group. There is such a wide variation in the cutting of the fronds and consequent intergrading of the forms that the problem of separating them is both a hopeless and a useless task. It takes considerable practice and much patience to learn only the three kinds here mentioned!

Note.—The scientific names of the Grape Ferns discussed in this article follow the nomenclature used by Dr. R. T. Clausen of Cornell University. For more detailed information about these ferns consult Dr. Clausen's "A Monograph of the Ophioglossaceae," Memoirs of the Torrey Botanical Club, Vol. 19, No. 2, 1938.

## Rhododendron Notes

CLEMENT GRAY BOWERS, *Editor*

### *R. "Decatros" = (R. decorum × R. "Atrosanguineum")*

This is one of those hybrids in which the unexpected has happened. When a highly prized seedling of *R. decorum*, received in 1924 from Prof. C. S. Sargent of the Arnold Arboretum first flowered here in 1929, its sweetly fragrant, Regal lily tinted blossoms were crossed with pollen of the red flowered Catawbiense hybrid *R. "Atrosanguineum"* in the hope of obtaining some highly colored trusses—and perhaps fragrant also.

The seed was sown in January 1930 and I had not long to wait for these extraordinarily precocious seedlings began to flower in 1932 and have been at it ever since. Nevertheless they have yet to produce a single deep colored corolla of any shade, all—and hundreds have flowered—are palest pink to white

with yellow shadings in the throat or sometimes with a carmine spot deep in the tube or again with pure pale cream or creamy white tinting the entire blossom. So perhaps it is just as well that none of the deep colors did come through as all of these are pleasing.

In fact we have another early flowering sort somewhat like the first one we described ("Boule de Neige" × *Fortunei*) except that it is a much more vigorous open grower with larger more open clusters of slightly deeper color tints.

*R. decorum* is unfortunately quite bud tender but this hybrid has had some of its buds injured in only one winter since 1932 so it would appear to quite possible of cultivation in those parts of the Eastern U. S. where the Catawbiense varieties succeed.

JOSEPH B. GABLE.

## Rock Garden Notes

ROBERT MONCURE, *Editor*

### *Dwarf Brooms for the Rockery*

CARL AND LOUISE STARKER

If you are looking for a delightfully easy shrub for the rockery, one that will perform beautifully regardless of heat or drought, by all means let me recommend any one of the dwarf brooms. I have found them invaluable for use in that crucial spot at the top of the rock garden where the hose just won't reach, as well as on a dry, rocky bank which seldom gets any sprinkling except that supplied by Nature.

The dwarf brooms take on many different shapes; some are rounded, upright bushlings, while others are creepers which hug the ground with earnest determination. In the ten years that I have been trying out the various types, I have found varieties suited to almost every situation in the rock garden, and they grow so slowly that I have had to move very few of them.

It is hard to imagine a more striking and colorful display than that staged by the brooms during their flowering season, and when they are out of bloom, they retire modestly into the background, their neat, inconspicuous foliage making a charming foil for the other flowers.

The fact that brooms are placed under two classifications, *Cytisus* and *Genista*, need not bother the ordinary gardener in the least. The distinction is a purely botanical one, and rather obscure at that. So far as his purpose is concerned, he can call them all brooms and go right on enjoying them.

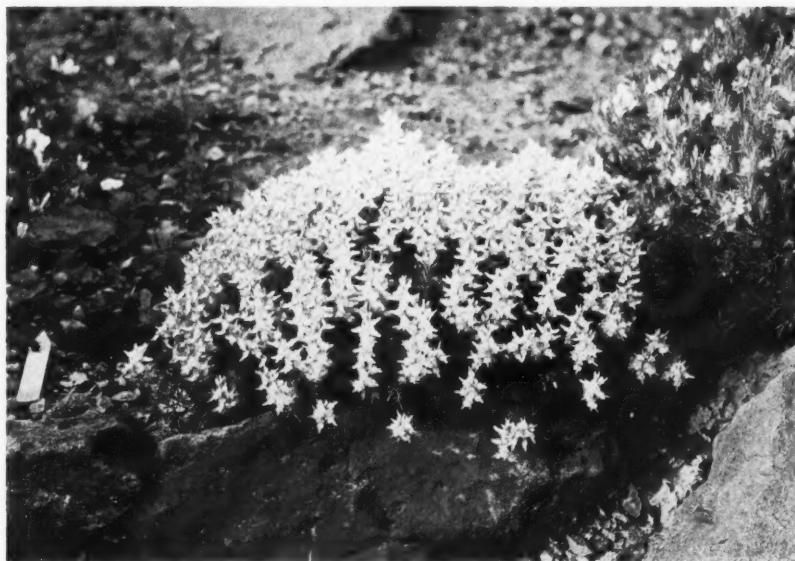
*Genista pilosa*, the most nearly evergreen of the smaller brooms, is very slow growing, and takes its time about establishing itself in the garden and getting ready to bloom, but it makes up

for this by staying small and keeping well within bounds. It makes a dense mat of creeping stems, well clothed in tiny, deep green leaves. It prefers to stick closely to the ground, but is very obliging in adapting itself to the contour of rocks in border or rockery. It has deep yellow flowers which are not so freely produced during the blooming season in May as those of most of the other brooms, but it continues to produce a few flowers off and on all through the summer and well into the fall. I have had it in the same place in my rockery for ten years, and it hardly seems to grow any larger, although its mats are thicker than when it was planted.

*Genista Villarsii* has semi-prostrate, brownish woody stems, from which spring many grayish green, twiggy branches. The color and quality of the foliage suggests some of the smaller leaved evergreens, gone very dwarf and open in character. It is very slow growing, and after several years has produced no flowers for me, although the blooms are yellow. This plant is very choice and rare on account of its slow growth and difficulty of propagation.

*Genista decumbens* lives up to its name very well indeed, as it is a sprawler of the most confirmed type. The prostrate stems are well clothed in oval leaves of a deep, smooth shiny green which lie in overlapping rows throughout their whole length. This choice little plant is very slow growing: plants two years from cuttings are still so small that it is very easy to lose them in the nursery bed. The flowers are yellow.

*Cytisus hirsutus decumbens*. This is



Geo. C. Stephenson

*Genista dalmatica*

another very low growing broom. The stems, well adorned with rather hairy leaves, lie flat on the ground, with the ends turning up just a little, although on the edge of my pool, the leafy branch tips just brush the surface of the water. The abundant stems form a dense mat of grayish foliage, which, in the course of seven years or so, will make a plant two or three feet across and not more than six inches high. At blooming time, which is in early May, the brilliant yellow flowers appear in such masses as to completely hide the foliage. They are borne stemless upon the trailing branches, so that the plant looks like a shining golden carpet.

*Genista sagittalis* is a semi-upright plant which will attain a height of twelve inches. It has deep green foliage of a curiously flattened character, almost like that of a cactus. It grows rather faster than most of the dwarf

brooms, but is very valuable on account of the great numbers of deep yellow flowers which appear in racemes at the ends of the branches in late May. It is very striking when placed at the top of the rockery or rock wall.

*Genista tinctoria flore-plena*. This double form of the Dyer's Greenwood is much lower growing than the single sort. It makes a quite regular plant. Its lush stems, adorned with many shiny, bluey green leaves erupt into double yellow flowers in late spring.

*Cytisus kewensis* is the most desirable of all the brooms in a number of ways. It is the only one of the dwarf brooms with cream colored flowers, and its graceful, weeping habit makes it very desirable for use at the top of the rock garden or wall, where it can cascade over a large rock and be seen to the best advantage. It makes a rather loose, decumbent plant with neat, deep

green branches, with very few leaves. In early May when the flowers appear, it turns into a fountain of bloom, every stem down to the tiniest twig covered with the showy, creamy blossoms. It requires no care or pruning, although the longest branches may be nipped without disadvantage to the plant. In ten years it will make a plant a foot and a half high by three feet wide.

*Cytisus purpureus*. This is a somewhat taller plant of looser habit than the preceding. Its arching stems make an airy, open bush, which, after a number of years, may grow to be eighteen inches high and three feet across. The leaves, which are borne in groups of three, are much larger than those of most brooms. The orchid lavender flowers, too, are unusual in brooms, which nearly always have yellow blooms. They are borne all along the stems in May.

*Cytisus Ardionii* makes a pleasant, rounded small bush which grows very slowly, reaching an ultimate height of eight inches and a width of a foot. The green stems are well provided with hairy leaves, which are quite large in comparison to the size of the plant. The lower stems lie on the ground, but curve upward at the ends, and as the other branches are fairly upright, the whole plant takes on a globular shape, with its base resting on the ground. The golden yellow flowers, which are crowded on the ends of the branches, appear in groups in April or May.

*Genista horrida* is a dense, silvery bushlet, in which the leaves have transformed themselves into sharp spines, which may be quickly felt by the admiring passer-by, who stoops to pat the apparent softness of the deceitful plant. It is to this characteristic that the plant owes its rather disagreeable name. It is a very attractive small shrub, and, while its deep yellow flowers are not quite so freely produced as those of

most other brooms, it has the very great merit of blooming late, and producing its flowers over a long period of time. It is a very slow growing plant.

*Genista radiata*. A very stiff, twiggy, airy bush, bearing its few small leaves in the axils of the wide-spreading, stiff green branches. It gives a light, yet rigid character to the graceful, upright bushes not found in any of the other brooms. The bright yellow blooms are produced at the ends of the branches in May.

*Genista dalmatica* turns itself into a very hedgehog of a bush, whose many short, spiny twigs suggest those of a gorse plant. This is a very good plant to use for discouraging wandering dogs. The brilliant yellow blooms are borne in dense racemes at the very tips of the branches, and make a most glorious show in mid-May.

*Cytisus Beanii* makes a rounded, open bushling with pleasant green stems very sparingly embellished with tiny green leaves almost too small to be noticed. The brilliant yellow flowers, which are large in comparison with the size of the plant, are put forth in late May or early June.

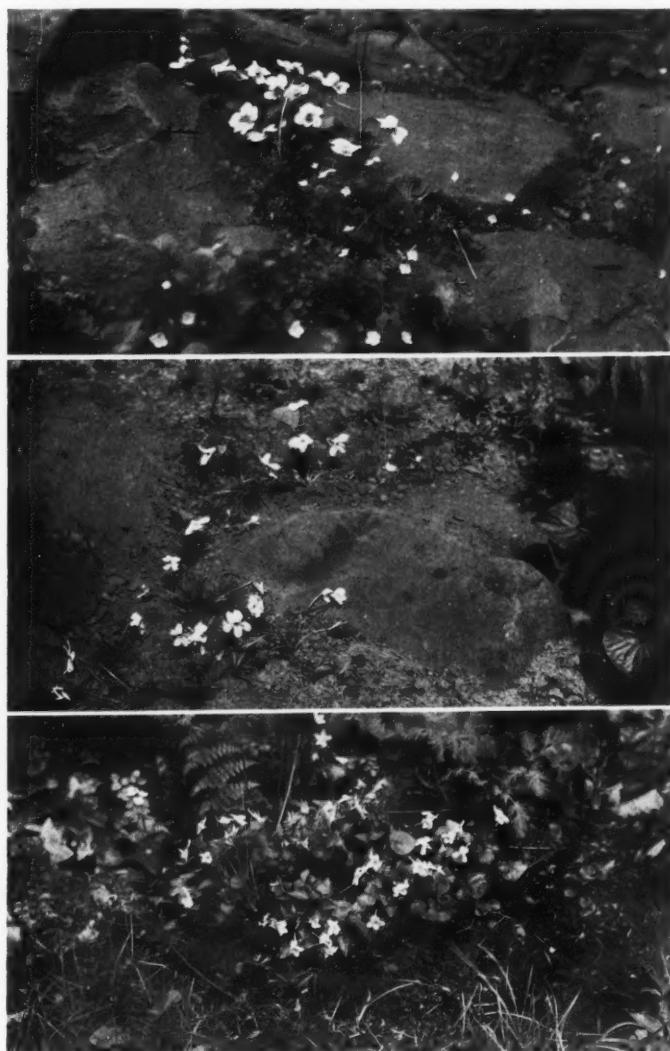
*Jennings Lodge, Ore.*

#### Some Good Garden Violets

ARTHUR H. OSMUN

The average gardener's regard for the violet as garden material is usually based on some disastrous experience with the commoner varieties which deluge the ground with cleistogamic seed and which, uncontrolled, are a nuisance generally.

It is unfortunate that the resultant biased opinion of the native violets deters us from trying some of the more desirable varieties, for there are many that are choice material and rival most perennials for utility, foliage and bloom, and these are so legion that for



*Violets in the rock garden*  
Upper, *Viola papilionacea*; center, *V. pedata alba*; lower, *V. rostrata*



*Viola primulifolia*

one to choose the best ten or twenty would simply reflect that one's preference. However, here are a few that are outstanding in many ways, all are choice garden material and simple of culture.

Considered by some a pest, *Viola striata* is one of the best; as a ground cover it is unsurpassed, as it throws out long runners of heavy foliage; by keeping these runners cut back it makes a compact mass of pleasing dark green leaves carrying well above them what is probably the handsomest of the violets both in form and coloring, a deep cream with purple stripe on the lower petal; it has the longest flowering season of any perennial we know, from April to December, and not its least desirable attribute is that it has no choice of soils and prospers equally well in sun or shade.

Little known but well deserving of a place in every rock garden is *V. rotundifolia*, the long spurred violet; though of

the *adunca* type, it has no synonyms, its bronzy green foliage carries well through the year, the flower is of good size in light shades of purple and lavender; given clear leaf mold in a half shady nook it will reign there like the queen it is.

In the East we have few desirable yellow violets, quite our best one being *V. pubescens*, the downy violet; it is a handsome flower and has good foliage but it soon dies down and disappears after blooming though a great joy in its brief life.

I find very few who have attempted *V. primulifolia* in their gardens and yet it is one of the simple violets to cultivate and is beautiful and interesting; given a mixture of sand and leaf mold in semi-shade it will form a mass of roots and a good clump of lobate-lanceolate foliage with small white flowers on long stems.

*V. saraea* is an albino form of *V. palmata* var. *cucullata* and is without

color pigment in root, corolla or flower; it is a handsome thing but its cleistogamic seed must be controlled for garden culture.

*V. Macloskeyi* is a beautiful little visitor from the far northwest; found originally in the Mount Hood region about 1890 and named for the late Professor George Maclosky of Princeton University, it has been little known since; originally confused with *V. pallens*, it has been established as a distinct species especially in its leaf form, that being nearly round; its flower is similar to that of *V. blanda* and it requires about the same general culture.

*V. papilionacea alba* can be either a delight or an insufferable pest. Its immense white flowers with a pale blue center borne in great profusion above heavy foliage which carries well through the year make it unexcelled

for massed planting or heavy border work; if one is careful to keep the cleistogamic seed capsules cut off it will become a handsome specimen plant.

*V. canadensis* is a lovely thing; tall, graceful, branching with distinctive foliage, it carries well its choice large white blossoms which are underlaid with purple, giving them a pinkish tinge, and with a large yellow eye. It is an adornment for any sort of garden.

Eight of a hundred or more available species is not a very large proportion but if one succeeds in establishing these in the garden one will have had a variety of interesting and worthwhile experience that will no doubt whet one's appetite for a wider knowledge of this entrancing family.

Plainfield, N. J.

## A Book or Two

*Old Fashioned Flowers.* Sachaverell Sitwell. Illustrated by John Farleigh. 193 pages. Chas. Scribner's Sons, New York, 1939. \$6.50.

The publication of this English book is peculiarly appropriate at this time when there is a renascent interest in many old fashioned flowers. The book opens with a chapter on the Jacobean Florist and gardening in the Parkinson epoch and closes with a chapter respecting the Nineteenth Century Florist. Intervening chapters are devoted to Auriculas and Primroses, Tulips, Pinks and Carnations, Roses, Fuchsias and miscellaneous garden flowers such as Scented Geraniums, Stage Dahlias, Ranunculus and Violas. Names of many old varieties are listed and the circumstances surrounding their origin,

anecdotes of searches for old plants and names of those now obtainable, with a plea for a world wide search for lost varieties; but the book is far more than a mere compendium of plant names. The accounts of cultivation and development of certain groups of plants by artisans and their preservation in remote cottage gardens is most interesting. Although everyone may not agree with Mr. Sitwell's comments on the merits of the plants and gardens of past generations, there is much food for thought in them. Mr. Sitwell seems wedded to the ideal that past eras in narrower fields possessed a definite unit, style and purpose in life and its many phases which is missing today; energies and thoughts have been so spread over such a large field that definiteness and balance have been lost par-

tially. Be that as it may, this is not a book to be hastily read, laid aside and forgotten, but one to be placed on a convenient shelf and delved into and enjoyed again and again.

The 12 colored lithographs and numerous black and white sketches by John Farleigh are in the style and spirit of the subject matter. The lithographs might be termed Victorian (without scorn), and probably purposely so. While they lack some of the lightness and liveliness of some older flower prints, they are faithfully interpretative of an era and possess individuality of a restrained type. They are suitable for framing if one dare desecrate the book by removing them. The entire format, including the cover, harmonizes well with the subject matter. The appended cultural notes by various horticulturists respecting some of the plants is helpful. However, the value of a book of this character would be still more enhanced by the addition of a well documented bibliography.

R. C. M.

*The Lily Year-Book, 1939.* Published by the Lily Committee of The Royal Horticultural Society of Great Britain, London, 1939. 183 pages, illustrated. 6/-.

This volume, the eighth of the series, follows worthily in sequence. It is dedicated to the late E. H. Wilson with a pleasant note on his life and works.

The articles that follow are:

Lilies at Estavan Lodge, Grand Metis, Province of Quebec, Canada, by Mrs. R. Wilson Reford, is an extended account of garden experiences.

European Lilies of the Isolirion Section, by Dr. Fred Stoker, is all that one expects of this writer.

On the Stigma of *L. Myriophyllum* Franchet by A. D. Cotton, Lilies in My Garden by E. N. Mullet, Report

of Lily Field Day, Helen M. Fox, List of Names of Hybrid Lilies, A Simmonds, The Propagation and Establishment of Lilies, M. Amsler, Lilies at Mount Stewart, The Marchioness of Londonderry and A Beginner's Difficulties P. A. Craig complete the articles.

These are followed by reports of meetings, dinners, correspondence and the like and then the book returns to articles, short pieces and records quite as important as those before the salt, including two very interesting articles on Fritillaries, the pictures for one of which arouse one's greediest appetite and really overshadow most of the lily pictures.

*Birds in the Garden and How to Attract Them.* Margaret McKinney. Reynal and Hitchcock, Inc., New York, 1939. 349 pages, illustrated. \$5.00.

This is a large and handsome book with clear print, and handsome pictures, many in color. It is written with the zeal and affection that lifts any book above the company of its fellows.

Although there is much in the book that will concern the gardener who wants to attract birds, it is primarily a bird book and the plants described and listed are those which provide food and shelter for permanent resident and migratory friends. The garden devised for them will be a pleasant but not a very showy place.

This reviewer likes plants better than birds and takes the ministrations of the latter gratefully, listens to their songs with pleasure, watches their antics with amusement but still feels that they have a lesser place in his affections. It would be unreasonable to expect even so excellent a book as this to overcome his prejudices. To all others it will be welcome and he, doubtless shamed.

*Carolina Gardens.* E. T. H. Sheffer. The University of North Carolina Press, Chapel Hill, N. C., 1939. 317 pages, illustrated. Garden Club Edition, \$3.50.

Other states have already seen the publication of chronicles of their gardens, old and new, surviving or restored. To that array is now added this volume on the gardens of the Carolinas. It is a handsome book, affably written with enough of history and personal intimacy to please the general reader and to excite, alas, that modern pest, the general gardener visitor. Since it is plainly stated when the gardens are open to the public, perhaps the intrusion of the unexpected visitor can be overcome, but it seems a little sad that we who live elsewhere can learn of the character and flower of local garden styles only by coming in.

*Judging the Amateur Flower Show.*

Mrs. Jerome W. Coombs, Chairman for The National Council of State Garden Clubs, Inc., 30 Rockefeller Plaza, New York City. 72 pages (2nd edition). \$.50.

The amateur flower show is usually the one public activity of even the smallest garden club and furnishes an arena for infinite labor, much anguish and not a little ecstasy. Labor is always reduced by good planning, anguish is always tempered by knowledge and understanding, ecstasy is made valuable chiefly by a safe measure of the spirit. As one who has, in times past, labored vainly, suffered absurdly and perhaps gloated unreasonably, it is a pleasure to recommend this useful and lucid booklet to all those who feel that flower shows must go on. No more temperate or discreet help could be wished.

*Growing Plants in Nutrient Solutions.*

Wayne Turner and Victor M. Henry. John Wiley & Sons, Inc., New York. 1939.

Much has been written of late in regard to the recent development of old principles long known but not turned to general commercial practice.

This book is addressed to the commercial man rather than the amateur gardener but all of us can read it with vivid interest. The chapter headings—A General View of Nutrient Culture, Commercial Advantages, Converting from Soil to Nutrient Culture, Small Scale Nutrient Equipment, Chemistry and Mathematics of Nutrient Solutions, Sources and Quantities of Salts Used, Nutrient Solution Formulas, Fundamentals of Plant Physiology, Essential Elements and Their Functions in Growth, Testing Nutrient Solutions, Diagnosing Deficiency Symptoms, General Cultural Conditions—give the outline of the treatment.

*Magic Gardens.* Rosetta E. Clarkson.

The Macmillan Company, New York, 1939. 369 pages, illustrated. \$3.00.

The preface begins: "This is not merely an 'herb book' but is meant to be rather a foundation book for any gardener and still of interest to the general reader who likes the thought of a garden or who loves to dream of the gardens of long ago." Such a program yields the author much latitude but apparently she has not been tempted into many sidepaths. Much that is here has been touched upon—much has been known before as is inevitable to any reader who has, like Mrs. Clarkson, read widely and omnivorously of old books.

For those who have not or cannot, it will be a delight. It is recommended.

*Three Acres and a Mill.* Robert Gathorne Hardy. The Macmillan Co., Ltd., New York, 1939. 361 pages, illustrated. \$4.00.

This is a very pleasant book. It has to do with the record of twelve years of gardening in a charming spot, enriched, as all gardening should be, by human experience and vision and in this case enlivened by adventures of plant collecting in places not so far removed from the author's home as to be breath-taking or world stopping, but foreign enough to be valuable in experience and in plants collected. The reviewer's enthusiasms are doubtless augmented by the many varied reports of narcissus-collecting in the wild.

It is always a perilous thing to shape a book about any one facet of one's life, but it seems to this reviewer that the author comes off very well indeed, particularly in that field of emotional reactions which we may admire as much or as little as we like without having actually to wallow in his raptures.

*The Iris Year Book 1939.* Published by The Iris Society. The Hon. Editor, R. E. S. Spender, Chetwold, Yetminster, Dorset, England, for the Society. 114 pages, illustrated.

After the first pages given over to the business matters of the Society, the main articles are: Irises for the Bog and Water Garden, by G. Dillistone, The Sibirica Group—Recent Additions by R. E. S. Spender (N.B. horticultural varieties, not species), Petit Irises by F. Wynne Hellings, Some New Varieties by R. E. S. Spender, Iris Colour Associations by Louisa F. Pesel, An Iris Odyssey by S. L. Pilkington, Notes on Iridaceae II by Norman J. Hadden (Hesperantha, Ixia, Lapeyrouseia, Libertia, etc.). This and That by Chas. E. F. Gersdorff, Iris as Grown in the Botanical Garden in Ko-

penhagen, 1938, Sisyrinchiums by Edward Cahen, Notes from Italy by Countess Senni.

It is quite a different book from our American bulletins and just as local in its character.

*Around the Year in the Garden.* F. F. Rockwell. The Macmillan Company, New York. New Edition, 1939. 350 pages, illustrated. \$3.00.

A very neat and useful "what to do now" sort of garden book which concerns itself with operations and management as the first interest and plant materials second, is this new edition of Mr. Rockwell's original opus. It is based upon the calendar year of and apparently for New York City.

The closing paragraph of Mr. Rockwell's introduction gives the best advice, "Let the gardener, then, read this book with a diligent eye for such advice and suggestions as he can apply to his own problems, but without any attempt to follow it blindly, for the real work, like the profit there may be (ten dimes saved is a dollar earned!), and the pleasure there is sure to be, must belong to the gardener, and cannot be put between the covers of a book."

*Harmony in Flower Design.* Arrangements by Isabel T. Ackerman, Rose B. Houskeeper, and Emma E. Thacher. Photographs by William G. Houskeeper. Dodd, Mead and Company, New York, 1939. 115 pages, illustrated. \$3.00.

This is a book of arrangements, well photographed on one page and discussed on the page opposite with a most important section of text at the end in which the photographer has his say and says it well.

The arrangers are more concerned with bringing to the attention of the reader the fact that they must "see

beauty" than anything else. Nothing could be more admirable and for the most part they have succeeded well. Although they claim to be as free as possible from styles, twenty-nine of their forty-eight plates obviously stem from the Japanese style, very temperately modified and often to advantage. To this reviewer, the arrangements descendant from European work are less arresting. There is nothing that really touches upon the truly stylized design of the present day.

No matter what one thinks may be in or out, no one can find fault with the authors' attitudes and aspiration. In short, this is a "must" book.

*New Pronouncing Dictionary of Plant Names.* Compiled by E. R. Robinson.

The Florists' Publishing Co., Chicago, Ill., 1939. 64 pages, 25 cents. Orders may be placed through our secretary.

This pocket size booklet is intended "as a handy reference booklet on pronunciation and spelling . . ." In compiling it, special reference was given to the second edition of Webster's New International Dictionary and L. H. Bailey's "How Plants Get Their Names." It is clearly printed, with simple indications of accent and sounding, as well as good definitions that might be longer if the book could have been larger. Should be very useful.

*Succulents for the Amateur.* Arranged and Edited by Scott E. Haselton. The Abbey Press, Pasadena, Cal., 1939. 167 pages and index, illustrated. Paper back, \$1.00, cloth, \$2.00.

This is a much more valuable book than its companion volume issued about a year ago. Like that book it is well illustrated. It has a similar spread of minute color illustrations taken from the exquisite color reproductions in *Succulents* by A. J. van Laren, a few larger color cuts from the same book and some original color photographs by the editor. The black and white cuts are numerous and for the most part splendid.

The essential plan of the book is the outlining of the plant families that can be discussed under the title with illustrations to suggest the great diversity of forms that are available in each case. In this the editor has had the assistance of many, but conspicuously of Messrs. J. R. Brown, Alan White, Boyd L. Sloan and G. W. Reynolds, names familiar to any one who has already discovered the succulent world.

There is a brief chapter on general culture but cultural remarks are to be found in the sections devoted to each plant. As before the background of experience seems to be Californian, except for the discussions of the *Liliaceae* which come from South Africa where aloes, gasterias, haworthias and their like have headquarters. The problems of the grower whose plants must spend their entire lives in pots is not much mentioned, with the attendant problems of insect control that presumably are a little more trying than those of the person who works out-of-doors.

It seems difficult to believe that any person susceptible to the beauties of these plants with their numerous forms and patterns could resist becoming a collector after reading this book.

## The Gardener's Pocketbook

*Moraea ramosa* [See page 55]

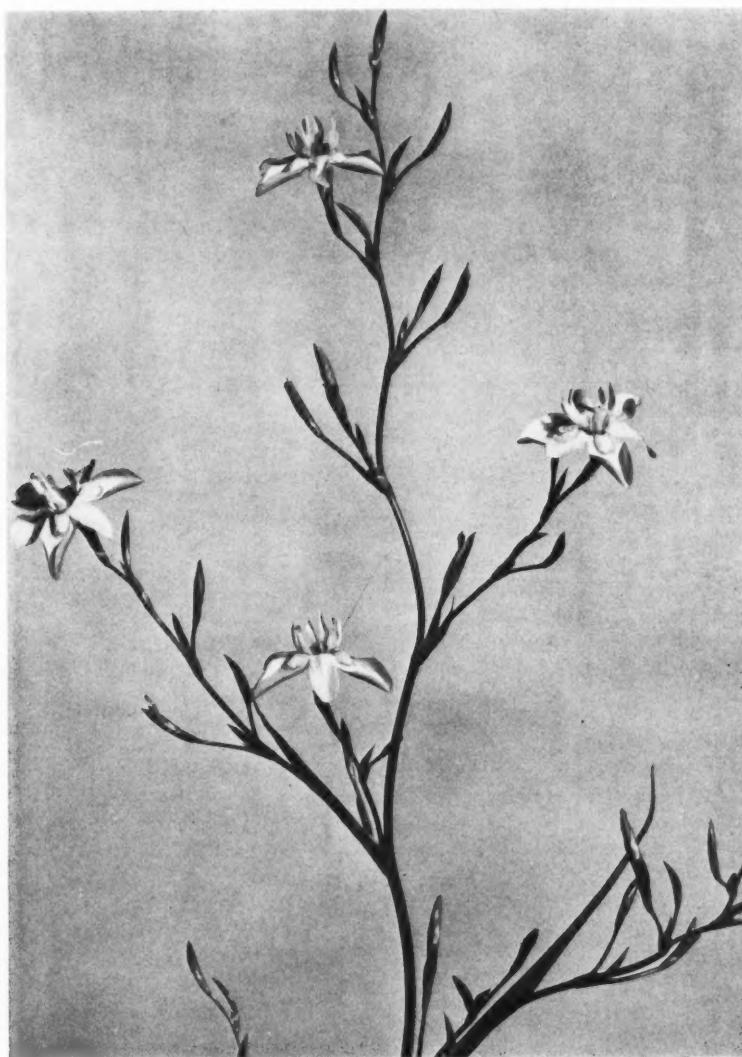
This is a new bulbous *Moraea* from South Africa with some very interesting characteristics. It grows along streamsides and likes plenty of water. Blossoms appear during May and June in Santa Barbara. The flower stalk is from four to six feet high and has many branches. The flowers are borne on the tips of the branchlets and are colored an amber yellow except for an oval at the base of the falls which is lemon yellow, surrounded by dark blue. There are also dark spots in the claw. The blossoms are about two and one-half inches in diameter and resemble those of *Moraea polystachya* except in color.

The plant presents a striking appearance when in bloom. The branchlets are thin and wiry enough to be almost invisible at a little distance and the flowers look like yellow butterflies fluttering among the green branches of the flower stem. The individual blossoms open about 11 a.m. on a sunny day and last twenty-four hours, with a new group opening each morning. The green leaves are at the base and are not very conspicuous.

There is a variety which was sent to me under the name of *M. ramosissima* which has glistening golden-yellow flowers with dark spots on the claw, and smoky lines on the back of the falls. It blooms about one month later than the type. *M. ramosa* sets seed freely, but this variety never does. The Director of the National Botanic Garden at Kirstenbosch does not recognize the darker colored form and says that there is only one kind, which is known as *M. ramosa*, and yet I received the original stock of both colors from South Africa.

*Moraea ramosa* (and the variety also) has the most striking and interesting root system of any bulbous plant I have seen. To begin with, there are two distinct kinds of roots on each plant—one of soft, fibrous roots growing downward in a normal way, and one of hard spinous roots growing outwards and upwards in such a way that it forms a kind of prickly basket-work around the base of the stem. Scientists would call the ones growing downwards "positive geotropic roots" and the spinous ones forming the basket work "negative geotropic roots." There is no true basal corm such as we find in *M. polystachya*. Nearly every node on the entire flower stem has a group of cormlets. At the base of the plants, in the axils of the leaves, some of these cormlets are fairly large and will bloom the first year that they are planted.

The spinous roots are very stiff and wiry and each lateral root ends in a sharp point. This area is four to five inches in diameter on a full sized plant and is always tightly packed with various sized corms borne on short stem branches—starting with one or two flattened ones about one inch in diameter, several roundish smaller ones more or less flattened and as many as a large handful about the size of a grain of wheat. Most of the larger ones (comparatively few in number) germinate readily and bloom the first season after being planted. I have been growing both forms of this *moraea* five seasons and have never had more than a very few of the smaller corms germinate—in fact so few that they might as well be thrown away. However, I have found that almost all of them will germinate readily, and several bloom the first season, after being treated with



[See Page 54]

*Moraea ramosa*

ethylene chlorhydrin at the rate of three to five cubic centimeters in a sealed one quart container for four to five days.\* The seed from the lighter colored form germinates freely and often produces a small flower spike in one season. These seedling corms are always round — one-fourth to three-eighths inch in diameter.

These two moraeas are probably like most South African bulbous plants in that they are presumably not hardy out of doors in any but the milder climates. A number of retail dealers listed *M. ramosa* this season and trial will soon establish their limits. In the localities where they will grow out of doors, they will be a distinct addition to the garden. They are large enough to make bold accents in the border without crowding the smaller plants. They do not need to be dried off for several months as do the other bulbous moraeas, such as *M. glaukopis* and *M. polystachya*.

The flowers cut well and make a dainty arrangement in themselves. The individual blossoms last only one day, but succeeding groups open daily for a week or ten days when cut.

*Moraea ramosa* and its darker colored form are two of a large group which will prove more and more useful as we become acquainted with it, and the individuals become available.

W. M. JAMES

*Santa Barbara, Calif.*

#### *Ipomoea leptophylla* [See page 57]

Knowing and admiring the bush morning glory at the roadsides and failing in one small effort to bring it to the garden by means of seeds, the time came when I determined to attempt moving a plant. Something of its root

\*Hastening the Germination of Dormant Gladiolus Cormels with Vapors of Ethylene Chlorhydrin. F. E. Denny and Lawrence P. Miller. Contributions from Boyce Thompson Institute, Vol. 6, No. 1, 1934.

habit I had learned and the recorded proportions and weight of the immense tuberous roots in old plants led me to select a very small one for digging. Such a one as seemed suitable had but two or three stems a foot or so in length. Its situation was a dry sandy valley free from stone, and the time late fall when the plant had become quite dormant.

For the novel adventure of following the root to its depths tools for whatever excavating might be required were provided, pick, shovel and post-hole spade. The last, with long narrow blade, dished from side to side and round-tipped, proved to be the only one needed other than a small coffee can held in the hand for scooping up loose soil. The crown of my little plant, an inch below the surface, was inconspicuous, merely a union of the dark reddish brown stems with the light brownish rootstock and a few low excrescences from which might develop future buds. The rootstock caliper was about three-eighths of an inch and uniform to a depth of fourteen inches where it rather suddenly widened into the tuberous portion, with a thickness of nearly two inches and a length of fifteen. From the lower slightly more tapering end the root continued directly downward, with one or two small spreading branches.

At the surface the soil was sandy but compact. At eighteen inches it became nearly pure sand and continued so, on down. In the narrow hole which had been made it was at last impracticable to work so the root was severed at forty-eight inches, its diameter still greater than a lead pencil.

The planting was likewise an experiment, the soil of my garden being a heavy clay that runs into shale at twenty-four to thirty inches, while sand, or gravelly and gritty soil are *Ipomoea leptophylla*'s native media. Here, a



Claude Barr

*Ipomoea leptophylla*

post-hole auger making a hole eight inches wide was sunk its length, and a smaller pit made below with the spade to accommodate the root without bending. The re-fill was half sand and half clay, sifted, carefully tamped the full depth, and watered.

Doubtless a requirement of the bush morning glory is a "dry" subsoil, and granted this it is accommodating. My charge has thrived through four seasons and grown to moderate size, with fifteen principal stems from the crown, a spread of forty-eight inches and a height of twenty. The apparent height is less, for the slender terminal branches and narrowly lanceolate, very un-morning glory-like leaves of light glossy green present an airy rather than a dense mass. Its sustained production of fine large trumpets of purplish pink, deepening to glossy purplish

red in the throats, is spectacular. Flowering begins in early July and often there are blossoms after mid-September, even under intense drought. It would be interesting to know what size the tuber has attained. A root preserved at the University of Nebraska weighed eighty pounds when fresh, and there have been rumors of weights above a hundred.

The native range of *I. leptophylla* is the plains states from Montana and South Dakota to New Mexico and Texas. This is mainly high country, relatively dry grassland, more or less alkaline. Yet, as I have noted, the species descends in "glades" along the Cimarron River in Oklahoma to an altitude of fourteen hundred feet, where the rainfall, or possibly ground water, supports neighboring groves of large trees. As far as I know the depth of

permanent moisture that it will endure has not been determined. But it would probably succeed where a light, lean soil and drainage to five or six feet is assured.

To the average gardener seeds offer the only means of acquiring plants, and no doubt they are easily germinated after soaking, filing or freezing or other treatment to soften the thick hard coats.

CLAUDE A. BARR

*Smithwick, S. D.*

From the Midwest Horticultural Society:

*Chamaecyparis pisifera plumosa*

Among the ornamental evergreens less commonly used in the Middle West are the various forms of *Chamaecyparis* formerly called *Retinopora*. The common name of these evergreens is Cypress, although the true Cypresses belong to the genus *Cupressus* which is not hardy in the North.

The plants belonging to *Chamaecyparis*, in their natural forms, are usually trees of considerable height. Most ornamental garden forms have been propagated from the juvenile stage of their growth and in consequence bear abnormal foliage and are relatively dwarf. Many of our most decorative small evergreens are found in this genus, affording a wide variety in texture and color of foliage, and difference in shape.

I particularly like the Plume Cypress, *Chamaecyparis pisifera* var. *plumosa*, an intermediate form of *pisifera* with foliage midway in development between *filifera* and *squarrosa*. It has slender branchlets of soft, feathery appearance, bearing tiny needle-like, bright green foliage, whitened on the lower surface. The habit is conical, with ascending branches, forming specimens of dense texture when sheared into formal shape. The Plume Cypress

is greatly benefited by annual shearing in order to encourage dense, compact foliage, and to keep it properly shaped. It is advisable to select a sheltered situation for this as well as other forms of *Chamaecyparis*. For exposed situations and places where they will not receive good treatment it will be better to rely upon some of the Junipers. *Chamaecyparis* have been propagated for so many years from juvenile or immature parents that they are likely to deteriorate rapidly unless given good care.

There are several forms of the Plume Cypress—a dwarf variety about two feet high suitable for rock gardens and foundation plants; a variety golden yellow in color, dwarfer than the type; and another with green foliage tipped with sulphur yellow.

*Sophora japonica*

An odd and distinctive specimen tree, still quite rare in cultivation, is *Sophora japonica*, called both Japanese Pagoda Tree and Chinese Scholartree. The latter name is more correct according to *Standardized Plant Names*. It belongs to the Legume family and its leaves and flowers are locust-like. *Sophora* reaches a height of 40 to 50 feet, with deeply fissured bark and spreading branches forming a dense, round head.

The pinnate leaves bear 7 to 17 leaflets, stalked, about an inch to two inches long, dark green and shining above, grayish beneath and slightly pubescent. A particularly noteworthy quality of this tree is its late blooming season. The cream colored flowers are produced at the end of every shoot in erect terminal clusters 6 to 9 inches long and appear in August. In winter it has a distinctive appearance due to the green color of the young wood.

Another valuable characteristic is its

ability to withstand drought, retaining its leaves and their rich green color in the driest seasons. As an avenue tree for city use or as a specimen shade tree in the yard it is equally useful and beautiful. It requires a thoroughly drained soil.

#### *Viburnum rhytidophyllum*

Another of my favorites among the lesser known ornamental shrubs is *Viburnum rhytidophyllum*, the leatherleaf viburnum from Central and Western China, the only hardy viburnum which is evergreen here. The shrub reaches a height of ten feet with stout upright branches, tomentose when young. It is a distinct and striking plant due to its bold lustrous foliage. The leaves are 3 to 6 inches long and about 1 to 2 inches broad, on a matured plant, dark green and strongly wrinkled above with brownish colored hairs covering the under surface.

My plant has not bloomed yet, but the flowers are said to be yellowish white, developed in fall and blooming in June. The berries, ripening in September and October, are red at first, changing to a lustrous black. As with other broad leaved evergreens, some shade from the winter sun is needed to prevent browning of the leaves.

#### *Cotoneaster racemiflora soongarica*

The large family of cotoneasters has many members of high value for landscape planting, including several evergreen varieties. They vary greatly in habit and attractiveness, and rely more upon the brilliantly colored fruit than their flowering ability for decorative effect.

I have grown several varieties and have found *C. racemiflora soongarica* to be the most ornamental. They like an open situation where they can reach

their full size, about 6 feet tall and 8 to 10 feet in diameter.

White flowers cover the spreading branches in June and are followed by coral-red berries which contrast vividly with the gray green leaves. The fruits are relatively large and abundantly produced, remaining until late in autumn.

Cotoneasters are not tolerant of shady, moist situations. To thrive they want a sunny exposure and a well drained soil.

ROBERT VAN TRESS

#### *Spathodea campanulata* P. Beauvois

[See page 60]

In Dr. J. F. Rock's "The Ornamental Trees of Hawaii," this handsome tree native to tropical Africa is called the Fountain Tree, a name said to be given it in India, where it is cultivated as an ornamental, because the unexpanded flowers "contain a quantity of water."

Our illustration gives an idea of the inflorescence with the brilliant green buds in the center incurving like a great chrysanthemum and the outer flowers expanded with heavy-textured petals of intense orange red, edged with golden yellow. The tree itself is well furnished with odd-pinnate leaves that make a noble setting for these brilliant terminal inflorescences.

A much better illustration is given in the ever-useful Curtis Botanical Magazine (t. 5091). The author of the accompanying text points out that Beauvois' original illustrations were quite inaccurate, excusably so since his field sketches had been destroyed by fire and his drawings and notes were made again from fragmentary herbarium material. The author regrets that in England (where it must be grown under glass) it "is the misfortune of this plant that it does not bear



H. F. Loomis

*Spathodea campanulata*

[See Page 59]



H. F. Loomis

*Schefflera actinophylla*

[See Page 62]

its blossoms until the tree has attained considerable size." He mentions also that Schumacher who described the tree as *Bignonia tulipifera* (a name that tells much to the layman) spoke of the flowers "as large as the largest tulips."

The flowers are really gorgeous individually, deeply salver-shaped with five lobes divided slightly as if in two lips. The outside of the corolla and the inside of the lobes are deep rusty crimson, the cup a little lighter. The sinuate margins of the lobes are marked by a thin line of clear yellow.

Lemaire's *Jardin Fleuriste* (1854) gives the note that it was discovered in 1787 not far from Chama in Oware by Palissot de Beauvois. Mr. Lindley (citation not given by Lemaire) believes the credit for its introduction into cultivation must go to Mr. Whitfield, who for several years at great risk to his life and health travelled through western tropical Africa to the great profit of natural history, especially botany and horticulture.

In its native country it is a tree of medium height whose wood "gives out a strong odor of garlic" when one bruises or crushes the twigs.

Only one other species is mentioned, *S. Nilotica* Seem., which the author claims to have villose-tomentose calyx (not tomentose) and impressed nerves (not raised or wanting).

Whether or not the Florida plants will come to be as self-sufficient as those reported in the Kew Bulletin article "The Useful Plants of Nigeria" remains to be seen. There the plant is considered to be a fine avenue tree up to seventy feet in height. Apparently it is becoming well established, as its seed is "winged, light and freely distributed by the wind." Certainly the gardener newly come to Florida can not fail to be astonished by the brilliant flowers of this exotic tree.

*Schefflera actinophylla* [See page 61]

This again is a spectacular plant on account of its beautiful foliage, which is quite large enough to be conspicuous and of a pattern unusual among our familiar native trees. The individual leaves which appear to be almost two feet across are radially compound with shortish peduncles and long leaflets of a shining dark green color. The illustration gives a clear idea of the plant, which is about twenty feet high.

It has not been the writer's good fortune to see this plant in flower but illustrations all show groups of terminal wand-like spikes almost three feet long studded with heads of smallish flowers that are said to be red in color. This latter statement is questioned by Seeman. "By the last mentioned author (Eug. Fitzalan) the tree is stated to be forty feet high and the leaflets varying to sixteen. According to Charles Moore the flowers are said to be *scarlet*, but this statement is not confirmed from what is known from other sources, not borne out by an inspection of the specimens before me" (Journ. Bot. ii:242 [1864]).

All the plants now growing in the Plant Introduction Gardens at Coconut Grove have come from seed from Australia save one lot which was raised from seed gathered locally, the parent tree having been raised from seed from Australia.

In many books this plant is still listed as *Brassaia actinophylla*.

*Bombax malabaricum* DC. [See page 63]

The first time this commentator saw the flowers of this spectacular tree, they were floating in a great copper basin on a table in the patio terrace of the Kampong, the Florida residence of Dr. David Fairchild. This doubtless might seem



H. F. Loomis

*Bombax malabaricum*

[See Page 62]

an ignominious fate for flowers of a noble tree that in its native India reaches a height of over one hundred feet, if it were not for the fact that there the falling flowers are gathered and eaten.

Since one of the features required of ornamental plants in Florida seems to be that they be as unlike any known northern plant as possible and as astonishingly different as possible, this tree with its erect trunk covered with warty spines that also line the branches, its huge dull red flowers in mid-winter, and its later leaves large and palmately compound, should fill the bill.

In Macmillan's "Tropical Gardening and Planting" (p. 83) its flowering season is given as January-February and in Florida trees seem to keep this schedule. That reference also tells that the "Red Cotton Tree" produces a wood that is used for the manufacture of tea boxes (p. 218) and for the building of out-rigger canoes (p. 83).

There have been at least ten introductions of this species through the Division of Plant Exploration and Introduction, Bureau of Plant Industry, U. S. Department of Agriculture, ranging from 1901 to 1936 with seed from varying sources, many from cultivated trees. From the notes of the Division, one gathers additional data. This tree makes a large trunk with a buttressed base, bears branches carried in horizontal whorls. The inner bark yields a good fiber suitable for cordage; the seeds yield the so-called silk cotton, too short and too soft to be spun but eagerly used for stuffing pillows and for gun cotton. The flower buds are eaten as a pot herb.

What thoughts one might have looking up into the branches of this foreign tree.

#### *Pachira fastuosa* [See page 65]

Although native to Mexico, this tree like many other tropical plants has been carried about somewhat, so that it may appear among the horticultural notes of other countries than its own. The strange appearance of its flowers had probably led more than one traveller to take or send home seeds, particularly in those early days when conservatories were more common than now, and when collections of important exotics were really collections and not just assortments of the most showy plants among the most showy genera.

The lush young growths push up vigorously and give the tree the same sort of look one finds in the free growth of young paulownia, to name only one northern tree with vigorous annual shoots.

Its unusual characteristics and beauty made it a favorite in old conservatory collections and these same beauties commend it for planting in warm areas in this country, especially those free from all frost and moderately warm.

It is a deciduous tree as it grows in the Plant Introduction Gardens at Coconut Grove, Florida, with flowers that begin to appear at least before the leaves, in February and March. The illustration shows the amazing flower buds with four petals, dark colored without, closed in a cylinder about the stamen masses but breaking open revolutely to show the almost white inner surfaces and releasing the huge brush-like mass of stamens, rose-tinted with yellow anthers, the whole almost a foot across.

The handsome leaves, suggesting those of the horse chestnut but more leathery in texture and with smooth margins, are fine enough in their own right.

They somewhat overshadow the fruits, which resemble in size and



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*Pachira fastuosa*

[See Page 64]

shape small cacao pods, containing edible nuts the size of hazel nuts and with "the flavor of peanuts."

*Ammocharis heterostyla* [See page 67]

Some time ago, some mature bulbs under the name of *Crinum ammochroides* were obtained from the Mt. Elgon Nursery, Mt. Elgon, Kenya Colony, South Africa. They were potted and kept in the greenhouse for two years, but they could not be induced to flower. Finally, with the hope of stimulating them, they were planted outside for a summer season. This move was rewarded by considerable quantities of flowers, throughout the summer. Several bulbs flowered two or three times. Seeds were set freely and a number of seedlings were grown.

In preparing this note, it became evident that these plants had been incorrectly labeled; according to the new concept reported below, they must be called *Ammocharis heterostyla* (Bullock) Milne-Redhead et Schweickerdt, a species which has been found only on the slopes of Mt. Elgon, where, in certain areas, it is said to be common. It is quite new, having been named in 1932.<sup>1</sup> So far as can be ascertained, the only illustrations of it are to be found in the article reviewed below.

The accompanying photograph is natural size and from it one may obtain most of the characteristics of the flowers. It ought to be noted that the umbel sometimes has as many as 18 flowers. As may be seen, the filaments are erect, only little exserted from the throat of the perianth tube. The style is always included even though it elongates as the flower ages. To the extent that this condition, rather than true heterostyly obtains, it may be said that the specific name is incorrect. The fresh flowers are creamy white with a

pinkish tube, and usually with a pink line on the lobes. As they age, usually in the course of two or three days, they become dull rose over all. They possess a mild, sweet fragrance.

The leaves are poorly shown in the photograph, unfortunately. As the plant had only temporarily been placed in the pot, they are not in their natural positions. As a rule, they spread along the surface, usually to a length of 25 cm., instead of standing erect. They are glaucous green, almost silky in texture, with finely serrulate margins. The withered tip is characteristic; it results from the fact that each season for at least several years, the old leaves grow out anew from the top of the bulb, and at the end of the growth period they die back completely. The leaf arrangement, like two opposite, plaited fans lying on the ground, is peculiar to *Ammocharis* and *Cybistetes*, and it adds no little to the value of the plant as an ornamental.

The bulb is about 10 cm. in diameter. It is heavily clothed with light brown, papery coats. Offsets seem to be produced rather freely under cultivation.

In culture, *Ammocharis heterostyla* seems very easy. It has flowered freely through the summer without particular care. The bulbs have been overwintered dry without difficulty. Since it comes from regions of relatively little rainfall, it is capable of withstanding a great deal of drought and, presumably, high temperatures. It seems to require full exposure to the sun. Unlike so many South Africans, it grows its leaves in the summer, thereby greatly extending the area within which it may be cultivated with the proper attention. As in most Amaryllidaceae, the seeds must be sown reasonably soon after maturity. At the current rate of growth of the seedlings, it seems that four or five years may pass before they reach maturity.

<sup>1</sup>Bullock, A. A. Kew Bull. of Misc. Inform., p. 505. 1932.



*Lilian A. Guernsey*

*Ammocharis heterostyla*

[See Page 66]

As an ornamental, it must be admitted that the plant is not highly exciting. Where it may be naturalized and grown in quantity, it will be well worth having for its reappearing fragrant summer flowers. As a pot plant it will have no value unless a way be found to induce regular flowering. Were it not for this, it might be a very useful subject on account of its size and proportions.

The appearance of a paper entitled "A new conception of the genus *Ammocharis* Herb." by E. Milne-Redhead and H. G. Schweickerdt<sup>2</sup> really prompted the writing of this brief note. This paper calls attention to some serious taxonomic errors, some of which date back to L'Heritier and the younger Linnaeus. From the history set down, it would seem that the whole gamut of errors has been run, from mismatching leaves and flowers to sheer gross negligence in attention to taxonomic details. The complexity of the situation which arose has scarcely been equalled.

The authors, in a very painstaking, tedious task, have managed to clear up the matter, but not until about six genera and almost innumerable species have been affected. No attempt will be made to detail the whole story here. However, there are several interesting parts that deserve mention, even though they do not bear directly on the subject. For example, it is shown that *Amaryllis longifolia* L. has been erroneously confused with the plant which botanists have called *Crinum longifolium*. Because of this misidentification, the latter must be called *C. bulbispermum* (Burm.) Milne-Redhead et Schweickerdt. *Amaryllis longifolia* is shown to be the same as *Ammocharis falcata* (Jacq.) Herb. of modern botanists; but this is now called *Cybister longifolia* (L.) Milne - Redhead et

Schweickerdt for reasons to be given below. With the exception of Ker-Gawler,<sup>3</sup> whose note on the subject was ignored, it appears that no botanist prior to these two has recognized this identity.

As an incidental matter it is pointed out that "Boophone" is the proper spelling for the genus we know as *Bu-phane*. It is explained that the word is derived properly from the Greek for "ox" and "murder," not from "toad" as Marloth thought. (Fl. South Afr. 4:115. 1915.)

Concerning the genus *Ammocharis* Herb., it is said that most of the trouble has resulted from the fact that in herbarium specimens a number of important characters are obscured, and from the lack of adequate material, either living or dried, in Herbert's day. Two species were recognized by Herbert: *A. coranica* (Ker-Gawl.) Herb. and *A. falcata* (Jacq.) Herb. Baker considered the former synonymous with the latter on the basis of several rather unnecessary errors. He stated that the fruits and seeds were unknown, yet in the key to the genera in his Handbook of the Amaryllidaceae, he places it on the basis of its fruits and seeds! Furthermore, he suggested that Ker-Gawler in Curtis's Botanical Magazine (t. 1443. *Brunsvigia falcata*) had mismatched the fruits of Brunsvigia with the flowers illustrated. Yet Ker-Gawler was the only one who had correctly diagnosed the material!

Throughout the taxonomic history of this group of plants, arbitrary treatment seems to have been the rule. One begins to wonder if this is true of most of the botany we are taught to venerate. If we must follow the rules strictly, a situation like the one detailed here causes far more trouble than it deserves. How much better it would be if

<sup>2</sup>The Journal of the Linnean Society of London. 52:159-197. October, 1939.

<sup>3</sup>Curtis's Botanical Magazine. t. 1443. *Brunsvigia falcata*. 1812.



H. F. Loomis

*Ficus mysorensis repandens*

[See Page 70]

one might follow Ker-Gawler, who, instead of changing the names, says: "We have restored to each the synonym that belongs to it, without attempting to disturb specific dominations by which both are at this time universally called and understood."

As to Herbert's treatment, the authors suggest that had he seen complete herbarium material, he probably would not have considered the two species as congeneric. On the basis of much more adequate material assembled from the herbaria of the world and supported by observations of living plants, Milne-Redhead and Schweickerdt have concluded that *Ammocharis falcata* (*Amaryllis longifolia* L.) is generically distinct from *A. coranica*. The former they called *Cybistetes longifolia* (L.) Milne-Redhead et Schweickerdt.

In the genus *Ammocharis* they place five species, four of which were formerly included in *Crinum* under a maze of names. Because of the complexity of the situation, it would be out of place to detail all of the changes here. Suffice it to say that: (1) *Ammocharis coccinea* Pax is reduced to *A. coranica* (Ker.-Gawl.) Herb.; (2) *Crinum ammocharoides* Baker, *Stenolirion Elliotii* Baker, and several others of Baker's species of *Crinum* have been reduced to *A. Tinneana* (Kotschy et Peyritsch) Milne-Redhead et Schweickerdt (according to the authors, this same plant has been introduced to cultivation in the United States under the name of *Crinum parvum* Baker<sup>4</sup>); (3) *Crinum heterostylum* Bullock becomes *A. heterostyla* (Bullock) Milne-Redhead et Schweickerdt; (4) *Crinum angolense* Baker and *C. curvifolium* Baker become *A. angolensis* (Baker) Milne-Redhead et Schweickerdt; (5) *Crinum Baumii* Harms becomes *A. Baumii* (Harms) Milne-Redhead et Schweickerdt. The crinums that have been trans-

ferred are those African species which produce distichous, biflabellately arranged leaves that continue elongation through several growth periods, dying back each season to the top of the bulb. Such leaves (described in detail above) are commonly truncate-erose at the tip with dead tissue adhering, frequently falcate in shape, and they frequently lie flat on the ground.

The genus *Cybistetes* (from the Greek for "tumbler" because the fruiting umbels become detached and tumble about in the wind) is closely related to *Ammocharis* and from it is to be distinguished by its declinate stamens, perianth making an angle with the pedicel, pedicels elongating in fruit, capsule dry, strongly ribbed, the ribs persisting. There is only one species (cited above). There will be many, undoubtedly, who will not accept this as a distinct genus. Be that as it may, the work stands out for its scholarship, depth and thoroughness. No stone has been left unturned in their efforts. There has been no work in this family in recent times that can approach it in these respects, and on that account only it must command more than passing notice.

CLAUDE HOPE.

*Ficus mysorensis subrepandens* (Wall.)  
King [See page 69]

There seem to be endless species of *Ficus* that have come into cultivation without any likelihood that we have even skimmed the surface and as in many another large genus there are members that are certainly the poor relations of the others. The edible fig of history and legend is the best known member, *Ficus carica*, with *F. elastica* the rubber plant of home and florist and *F. repens* the greenhouse creeper as runners up.

For the Florida garden, one need not limit his choice to such but does need

<sup>4</sup>Herbertia II: p. 31-32. 1935.



*Claude Hope*

*Lavatera, Loveliness*

[See Page 72]

watch lest his whole place be dwarfed by some swift-growing tree with invasive roots and showering leaves. Among these huge trees are many that are distinguished by handsome evergreen foliage, usually of dark green color and shining surface. The lesser details are often even more interesting and there is scarcely a species or form that does not produce a pattern of foliage and twig that is not beautiful.

For this reason the illustration given here was made from a photograph taken into the foliage mass to show the dull yellow velvety fruits tight against their large evergreen leaves marked with a pattern of light green veins.

The plant was first raised from seed and planted largely as a windbreak, a purpose that it filled excellently since the rather dry rocky soil filled with lime did not appear to be an ideal location for many other plants. Here it grew slowly at first with branches well down to the ground in contrast to its habit in its native country where in the foothills of the eastern and southern parts of India it is said to make a fine tree with relatively few aerial roots and these hanging close to the trunk.

In the Annals of the Botanic Garden of Calcutta (1:20 [1887]), King reduces Wallich's original species to a form of *F. mysorensis* with the note that it differs from the type chiefly in the larger often narrower leaves, with more nerves at the base and in lateral pairs, the differently shaped fruits and various minor points.

He points out that the form "is not found in Southern India, but replaces the other two at the base of the Eastern Himalaya, in the Khasi Hills and in the Burmese hill ranges at elevation of from 1,000 to 2,000 ft. It grows to be a very large tree." The older trees in the garden have developed well and appear to be falling into their native pattern with a well-developed trunk and

few aerial roots, clinging close to the trunk.

#### *Lavatera*, Loveliness [See page 71]

It is a pleasure to turn up an old garden flower of real merit once in a while, particularly if it is one that has suffered neglect by gardeners, and more particularly if it is one of easy culture. Just such a plant is *Lavatera* Loveliness, the annual mallow. Last spring, seeds of this were purchased, along with those of a few other unfamiliar annuals, with the idea of appraising them as garden plants. Under the circumstances, it was scarcely to be expected that any of the plants, much less the old ones, would be sufficiently good to warrant high praise. It seemed obvious that there must be some objectionable feature, either in the plant or its cultural requirements, that discouraged gardeners from growing an old, long-known garden annual. To judge by the results of one season's trial, such was not the case with the present subject.

*Lavatera* Loveliness is a plant of the easiest culture. The seeds are sufficiently large that direct sowing in the open, where the plants are to grow, is preferable. Near Washington, D. C., the seeds were planted in late April; germination was prompt, and the vigorous seedlings grew off without any reversals. The plants began to flower in late June, and from then until mid-September there was a very satisfactory showing of flowers.

The accompanying photograph is about one-third natural size. The individual flowers, therefore, measure about three inches across. The color is an unusual shade for a mallow, a clear rich pink without the usual suggestion of magenta. It is enlivened by carmine veins which become broader at the base, sometimes merging into a dark blotch at the base.

The plants reach a height of about three feet under ordinary conditions, but they may be forced to a height of six feet. It has been grown and recommended as an annual hedge by the English. With its rapid growth and strong basal branches, it should be very suitable for that purpose. The upright-pyramidal plants are usually compact, and freely branched at the top. The flowers are mostly solitary in the axils of the leaves but they are borne very freely. As evidence, the photograph may be considered as a fair sample of the plant's free-flowering characteristics.

As a mallow, it is unusual in another respect. It is said to make a good cut flower; those who have tried it say that the flower buds continue development for several days after cutting. In *The Garden*, Volume 51, page 212, 1897, its use in this fashion is particularly emphasized. In *Better Homes and Gardens* for February, 1940, it receives well merited praise by a middle-western gardener who mentions its value as a cut flower.

The variety belongs, undoubtedly, to the species, *L. trimestris* L. variety *splendens* Hort. A handsome color plate is that in *Curtis's Botanical Magazine*, t. 109, 1791. There, it is said that Parkinson wrote of it as the "Spanish Blush Mallow." In *The Garden*, Volume 53, page 62, 1898, there is a good color plate and a brief history. It is a native of the Mediterranean region, and was introduced to England in 1633. The English seedsmen, Sutton and Sons, apparently introduced the variety Loveliness in 1914 as a variety of *L. rosea* *splendens*. *L. rosea* is considered a synonym of *L. trimestris*.

A brief search, prompted by curiosity, disclosed that the firm of W. At-

lee Burpee began offering seed of this variety in 1917, as *Lavatera splendens* Loveliness. Without doubt this is *L. trimestris* *splendens*. At the same time, seed of a variety *alba* was offered. (This is still available from some seedsmen.) Later, this was replaced by the white-flowered variety Purity, which, unfortunately, seems unavailable now. English sources remark that crimson and purple varieties occur, neither of which is available now in the United States. A variety Sunset, also pink, is offered by several seedsmen. Surely all of these are worthy of a trial.

CLAUDE HOPE.

#### *Cryptanthus* as House Plants.

Occasionally one yields to an impulse and buys a plant that he has no special use for just to satisfy his curiosity. Such was the case here for among the piles of little plants, cactus seedling, cuttings, sansevierias, crassulas and the like that lay on a gift shop table were various plants that looked more or less like little pineapple tops. A sample of each was gathered, taken home, potted in a soil rather rich in humus and set on the shelf where they soon let it be known that they were the thirstiest of all the inhabitants. Several proved to be merely forms of *C. acaulis* which are nice enough, forming crowded rosettes of foliage variously tinted with dull rose and bronze; one was *C. Beuckeri* with clear green leaves variously marbled with white and the third was *C. bivittatus*. This in spite of its description has made a short stem, well furnished with recurving leaves of pale bronzy green lined with darker bands, all tinted with dull roses. After two years, the plant shows no sign of failing vigor and has made as little demand as one could ask.

## Two Useful Gasterias

ON THE office window ledge are two gasterias that have been very conspicuous among their fellows for a slower rate of growth, keeping well within the bounds of a three-inch pot, *Gasteria dicta* and *G. nitens*. There is no evidence to suggest that the latter should always remain small, but the short crowded growth of the former promises well for a long life in a small pot. Since gasterias are among the best of succulent plants for the window ledge, these two need a special word. Personally I prefer the former, which is one of the spiral forms, twisting about a short axis, with crowded leaves not much over two and a half inches long. Many small plants sprout from about the base of the stalk, that can be left to develop in place or can be taken off and started as new plants. In the latter case the small plants are so slow in growth as to seem almost like imitations.

All gasterias have rather thick leaves usually of dark green with various marks and mottlings which lie flat on the surface in some species or are raised like particles of dull pearl. Each of these species have blotches on the surface of the leaf brilliant and clear in the newest leaves and growing duller as the leaves age. Some of the oldest leaves on our plants which have lived on the sill for nearly two years are now almost solid green.

All gasterias flower but the gardener who can grow them out of doors or who can give them large pots in the greenhouse has the advantage of better growth and freer flowering. Neither of these plants has flowered as yet but others of more ample habits have flowered even in the confines of the window

shelf. All so far have shown the typical stalk with pendent flowers, shaped like bird's heads and tinted in green and salmon pink with touches of yellow. As the flowers are somewhat translucent the color through them is very lovely, when sunlight falls on the flowering shoot.

Although it may be recorded elsewhere, we have seen no exact reference to the amount of cold that these plants will stand. This is a factor that many an indoor gardener would like to know. Our window faces south from a room, that like others in office buildings is often too hot for comfort. The window is left open all summer and well into the autumn, then is closed in part but not enough to prevent a draft of cold air that blows across the plants. So far the only sign of injury that has appeared has been the appearance of blotches that are more like burns than anything else. More careful and more frequent washing of the leaves than had been the practice, seems to have brought this to a close, as if caused by soot or dirt injuries.

### WATERING POT PLANTS

Two useful tricks were learned from Mr. Bates of ivy fame. One was the practice of putting a small flat stone on the surface of the soil, in the pot, or even two or three. Then when watering from a small can, without a rose, the stream of water can be played on the stone and will not disturb the surface level of the soil.

The other was the use of a rubber plant sprinkler in place of a small watering can. It is often quite as easy to take a small bucket of water to the plant shelf as to carry a small watering



Courtesy The Arnold Arboretum

[See Pages 58, 59]

Upper, *Sophora japonica*, the Chinese Scholar Tree; lower, *Cotoneaster racemiflora soongarica*

pot. To dip in the sprinkler is easy and to let the water flow gently from the sprinkler to just the right level in the pot is easier still. We first decried the practice and then adopted it. The slower flow, often allows a better judgment of the rate of absorption and prevents overflowing.

#### *Narcissus bulbocodium monophyllum*

Among the many plants that do not seem to know when winter is over is this charming hoop-petticoat narcissus for Algiers. The grassy leaves begin to appear in late autumn and the flower buds soon show in the bases. When the snow melted from our frozen January (1940) several flowers were revealed ruined by the ice and a fair number of buds that look as though only one or two warm days would bring them to opening.

For the gardener who lives in a climate not subject to these trying ordeals, this should make a true winter flower. Here the tenure of its stay is possibly problematical, although the leaves do not show any particular injury as yet.

#### PLANT NAMES

The mouth-filling name of the last item will serve well enough as excuse for several acid words on this subject. It is a particularly fine case since, as every one knows a narcissus is always a narcissus but sometimes it is also a daffodil and also a jonquil.

This plant belongs to the group that has a special name, the hoop-petticoat narcissus, with a third name that suggests that it has but one leaf, a statement not always true. So far as I know no one has proposed to rechristen this, but it may come any day.

For the plants that are named in this magazine, that have no names in English, none are invented as no one on the staff has the temerity to suggest

that the Latin names are not just as euphonious as any we might suggest.

What could be nicer than Schefflera? It moves easily on the tongue, has no dissonances, no awkward combinations of consonants. Why may it not slip into our language as gently as zinnia or petunia? Are we so unwilling to make the adventure of an occasional new word? Or do we prefer to confuse the issue with names of our own invention, like children in a fairy tale?

What a pleasant name is *Bombax malabaricum*! It has a rather pompous sound, bombax! And malabaricum, mouth-filling and immense?

If one went on, he might even say that had he time, he might invent a very catalogue of pleasant sounds, with much to commend their entry into our harsher mother tongue beside mere expediency.

#### *Nymphoides aquaticum*

In one of the catalogues that lists plants for the aquarium there is offered a "banana plant that grows from the seed of the snowflake lily." This is a truly interesting statement and one that piqued our curiosity. An inquiry at the local pet shop provided the plant, a curious affair with a bunch of tuberous roots that looked not unlike a hand or two of green bananas in miniature with one or two leaves not unlike those of a tiny water-lily. Inquiries among botanical friends soon brought the additional information as to the real identity of the plant, the name given at the head of this item. The plants that were purchased for observation were not left to float aimlessly like under-water parachutes in the aquarium, but were planted in small pots and set in a deep pan of water so that only about two inches of water stands above their crowns. The leaves have righted themselves and more have pushed out to spread near the surface with somewhat

the carriage of those of a small nymphaea. How long it will be before they can really get into the full flush of growth that they might have in the open, where the flowering will be more important than anything else, remains to be learned.

#### SEEN IN THE CATALOGUES

Catalogue shopping is a dangerous pleasure but one that is rarely avoided by the gardener. The lists are coming in now and as always are full of interesting plants in far greater numbers than any one could afford, either in purse or in garden space.

For years, we have had available tigridias in reds, yellows and in mixed colors which usually turned out to be mixtures of reds some on the yellow side of red, some on the pink side. Now it is possible to purchase all of these and several other forms. There are two white varieties, one pure white and one white with yellow in the central bowl. These are exquisite forms and even if they seem a little less robust in their growth are well worth the extra care to keep them going. There are also yellows, one with a red-spotted central bowl and one without any other coloring. These too are well worth adding to the mixture or to plant alone. As yet we have not handled any of the several reds and pinks that have been separated as clonal varieties, but if they are any lovelier than the variants that can be had in a good mixture, they must be beautiful indeed. For some years we have grown a series of seedling red forms selected from a mixture because of real or fancied variations in the mottling of the bowl. As far as we can tell, without having made actual photographs, these variations are approximately uniform from year to year, so that in time one might build up a stock in which the darkest forms which come from the confluent blotchings in

the bowl would add another type to the selections.

There are now several lists of varieties of the large-flowering clematis hybrids that are amazing improvements over the small listings that were our regular fare only a few years ago.

Hellebores were once hard to find and expensive to purchase. Now they are much easier to discover but are still among the expensive perennials. This is easily understood when one considers how slow they are in propagation and how capricious they may be in establishing themselves.

*Lycoris squamigera* which still appears in trade as *Amaryllis Hallii* is another useful plant that is becoming available again and within reach as well. There was a time when this could be had, neighbor to neighbor, then eclipse, then exploitation and now again general circulation.

From the same part of the world that reports the ipomoea in this issue comes a delightful list of native plants which include among other things, several native phlox species *Phlox alyssifolia*, *andicola* and *Hoodii* all of which sound as if they might make useful variants from the more common eastern species. There are many other things of value in the same list but the one we are meant most to see is *Verbena bipinnatifida*. The species verbenas have been having a place in the sun of late, which is interesting since the garden forms have also had a going over. The catalogue says the color is "brilliant blue lilac" which sounds very suspicious when applied to any verbena.

The habit is that of most verbenas, a more or less prostrate mass of stems from which rise the typical verbena head in steady procession from "late May until steady freezing forces a halt."

Now that the forms and variants of our eastern spiderwort (*Tradescantia virginiana*) are becoming the center of

attention and use in shady gardens, it may be that some of the other species may have a little attention. Two are listed in the same catalogue with the verbena and the phloxes.

In another catalogue are listed several hybrids of *Primula Juliae* which did not appear in the notes in the Rock Garden section. It is to be hoped that some member will buy them all and get in a report to Mr. Moncure.

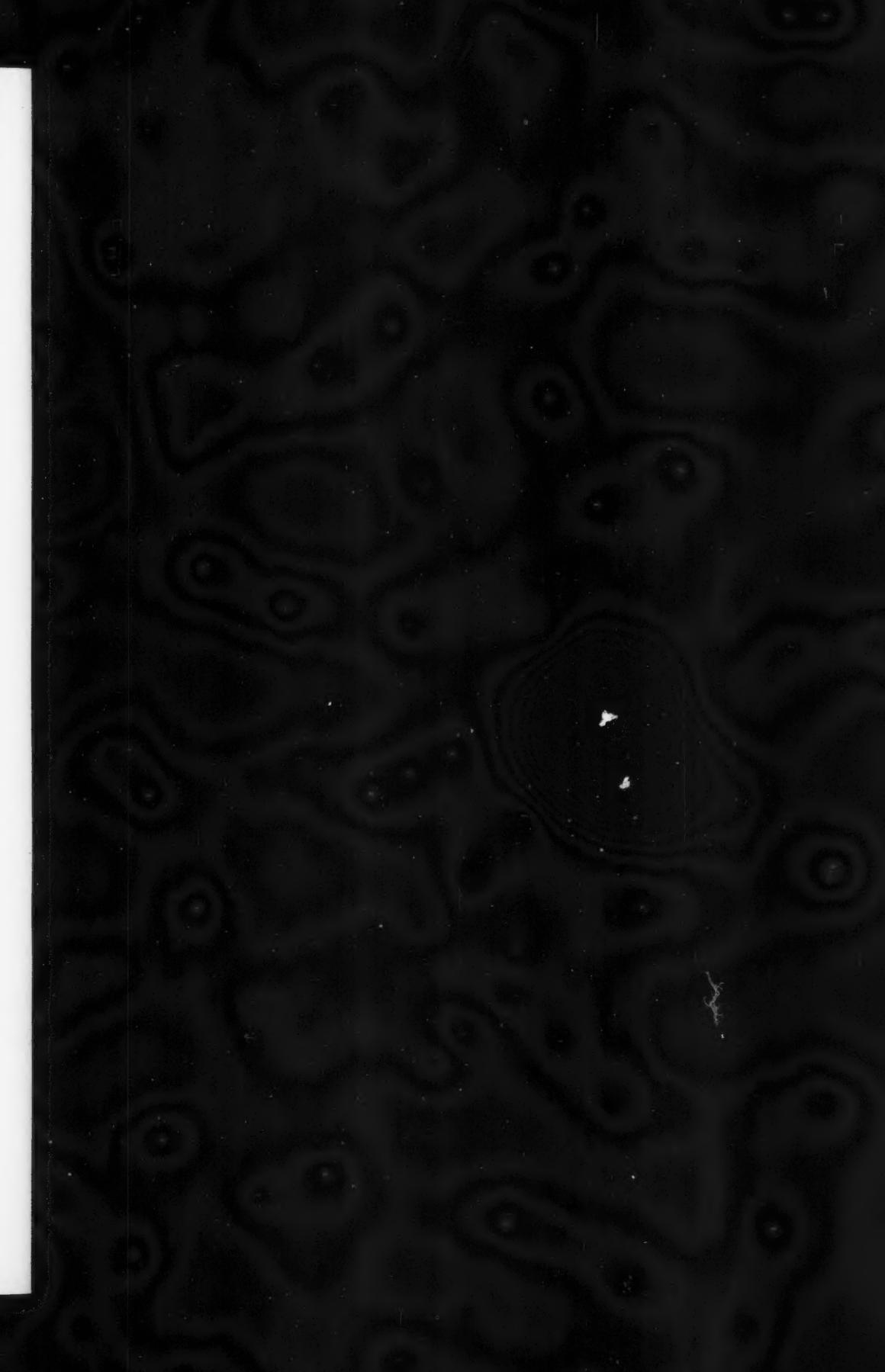
*Kalmiopsis Leachiana* which was described and illustrated long ago in our magazine, is now appearing in many catalogues and one gives a rather more intimate picture than we were able to offer then. It is a most attractive small shrub with showy pink flowers.

Lovers of daphnes will be pleased to see a list in which *Blagayana*, *collina*, *dauphinii*, *genkwa*, *laureola*, *ncapolitana*, *petraea* and *petraea grandiflora* are listed in addition to the few species that we all know. Not all of these are of equal interest in the garden and not all are equally showy but all have the

same characteristics with scented flowers.

The list of heaths and of heathers continues to increase so that the wishful can have almost as many named forms as if he were living abroad. The descriptive notes speak feelingly of glowing carmines and luminous reds all of which may or may not be accurate but will assure deeper colors than some of the older forms.

*Roscoea cautiloides* also listed long ago in our pages, makes it bow in the West and in the same list one may find offerings of the roots of some of the perennial nasturtiums. Readers of English books and visitors to those gardens will recall the beauty of the small but brilliant scarlet flowers of *Tropaeolum speciosum*. No one seems to know exactly how much frost or cold this species will tolerate, so doubtless some enterprising Easterner will have to make that contribution to our garden lore. *T. podophyllum* is listed in the same catalogue and this apparently is less hardy than the first mentioned.



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